

Revolutions and Re-iterations

An Intellectual History of Problem-based Learning

Virginie F.C. Servant

REVOLUTIONS & RE-ITERATIONS

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Revolutions and Re-iterations
An intellectual history of problem-based learning

Revolutie en reïteraties
Een ideeëngeschiedenis van probleem gestuurd onderwijs

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REVOLUTIONS & RE-ITERATIONS

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REVOLUTIONS & RE-ITERATIONS

By most people’s reckoning, problem-based learning (PBL) – a mode of small-group, guided education that uses problems as the starting point of learning – has been around for over 45 years. In that time, it has spread like a wildfire through medical and health sciences education, but increasingly also through engineering, law, psychology, social sciences and even liberal arts and humanities education. Along the way, it has morphed into all manner of contraptions – some people adopting this or that aspect of PBL without the rest, others omitting one part and tacking another onto it. To sort through the confusion, some attempts at providing a taxonomy of PBL programmes have been made, but these efforts are quite descriptive and do not deconstruct the process by which such variations have been arrived at.¹ At the same time, the names of Dewey, Popper and Piaget, among others, have been used for years as a ‘rationale’ for PBL without specifically linking those ideas to the history of the method.² In short: nobody could really remember where PBL came from or why other than ‘it came from a medical school in Canada’, and given this unknown, interpretations were flourishing without specific grounding in the intellectual filiation of the method. Most likely because of this flurry of viewpoints, it is impossible to find a single definition of PBL, and it is clear that researchers neither fully agree on the principles, nor on the practice of the method. One need only look at the two definitions proposed above to understand the scope of the problem:

Two definitions of PBL	
Criteria for PBL listed in Chng, Yew & Schmidt³	Criteria for PBL listed in De Graaff & Kolmos⁴
The use of authentic problems for students to work on without prior preparation so as to achieve the required knowledge.	The learning process is divided up in the three central components: group-work, self-directed study and tutor-support sessions.
As problems are used as the starting point for learning the number of lectures are limited.	The course is best organized as a project to develop organizational and co-operative skills.
Students initiate their own learning whereby students work in small collaborative groups under the flexible tutelage of a tutor who guides the learning process.	The type of projects are highly structured and guided by the tutors, such that while remaining the property of the students, they correspond to the learning outcomes expected within the curriculum.
Students would have sufficient time for self-study (<i>i.e.</i> to study relevant literature on their own).	The assessment patterns have to be changed to reflect the change in pedagogy.

¹ Chiu-Yin Kwan and Leslie Tam, ‘Hybrid PBL-What is in a Name?’ *Journal of Medical Education* 13, no 3 (2009): 76–82; Henk G. Schmidt, Henk T. van der Molen, Wilco W.R. te Winkel, and Wynand, H.F.W. Wijnen, ‘Constructivist, Problem-Based Learning Does Work: A Meta-Analysis of Curricular Comparisons Involving a Single Medical School’, *Educational Psychologist* 44, no. 4 (2009): 227–249.

² Henk G. Schmidt, ‘Problem-Based Learning: Rationale and Description’, *Medical Education* 17 (1983): 11–16.

³ Esther Chng, Elaine H.J. Yew, and Henk G. Schmidt, ‘Effects of Tutor-Related Behaviours on the Process of Problem-Based Learning’, *Advances in Health Sciences Education* 16, no. 4 (2011): 495.

⁴ Erik De Graaff and Anette Kolmos, ‘Characteristics of Problem-Based Learning’, *International Journal of Engineering Education* 19, no. 5 (2003): 658.

We can see some similarities in the definitions: both promote small-group work, under the guidance of a tutor, giving greater emphasis to student self-directedness. However, while the first definition stresses the importance of using problems as the starting point of learning, the focus of the second definition is on the learning format (projects) and on learning outcomes such as cooperative skills. These divergences yield vastly different educational practices that are currently being thrown under the umbrella term of ‘PBL’, often without much consideration of the deep seated differences that underpin them.

Therefore, I began this research with Henk Schmidt in 2012, with the objective of providing a PBL with the philosophical and historical foundation that it was missing. We hoped that this research would begin to clarify the meaning and scope of PBL in education of all disciplines and levels. Schmidt had already been providing PBL with a theoretical and empirical basis for years in terms of its psychological rationale, specifically in terms of its learning benefits, but the philosophical and historical rationale was largely missing.⁵ The overall research question guiding this thesis was therefore: which theories, ideas and practices were directly influential in the early development of PBL in the late 1960s and early 1970s, and to what extent did these shape the practice of PBL?

Certainly, some historical accounts of PBL have been attempted. In 1991, PBL pioneer Bill Spaulding penned a lengthy history of the first programme to use PBL at McMaster University, but its very descriptive focus was on the development of the various medical departments of the school rather than an analysis of the education method.⁶ Additionally, Spaulding was no historian: he worked with what he knew from his personal experience and complemented it with archive materials where necessary but there was no indication of a particularly historical method being used in his work. Although this book did inform this research, it did not provide much indication of the philosophical or theoretical underpinnings of PBL. In 2008, ‘Barb’ Mueller, the founding chair of surgery of McMaster, wrote a short history of the school which provided some reflection of the context in which PBL was born, but this was a very brief piece of work, and once again informed by the experience of the author rather than an effort to use a historical approach.⁷ In Maastricht, Peter Knegtman wrote an in-depth historical account of the foundation of the university, and whilst this is a work of a scholarly historical nature, it glosses over the subject of PBL.⁸ Instead, the primary purpose of Knegtman was to illustrate the political processes that took place in the build-up to the university and the impact these had on the shape of the school that eventually came out of this. Although much has been written about Aalborg University, including commemorative books for specific anniversaries and collections of interviews with historical figures, it has yet to record truly historical piece of its

⁵ Henk G. Schmidt, ‘Foundations of Problem-Based Learning: Some Explanatory Notes’, *Medical Education* 27, no. 5 (1993): 422–32.

⁶ William B. Spaulding, *Revitalizing Medical Education, McMaster Medical School the Early Years 1965-1974* (Hamilton, ON: B.C. Decker Inc, 1991).

⁷ C. Barber Mueller, ‘McMaster University Medical School: The Little School that Could – and Did’. *Mac. Univ. Med. Jour.* 5 no 1 (2008): 29-33.

⁸ Peter J. Knegtman, *De Medische Faculteit Maastricht: een nieuwe universiteit in een herstructureringsgebied, 1969-1984* [The Medical Faculty Maastricht: a new university in an era of restructuring] (Assen: Van Gorcum, 1992).

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specific educational method.⁹ Its older sister Roskilde University did have a thorough history and historiography written by Else Hansen, who wrote her PhD on the subject.¹⁰ However, on the one hand, Roskilde does not recognize itself as a PBL institution and so one could argue its history is only relevant to PBL in the sense that it informs the Aalborg debate, and on the other hand, Hansen's history is, like Knegtman's, largely focused on political processes rather than education methods.

In terms of the intellectual history of PBL, Schmidt provided the first real attempt at tracing the intellectual foundations of the method, beginning in 1983 with a paper reflecting on the philosophical underpinnings of the method and concluding in a short book chapter in 2011, but this effort was largely incomplete.¹¹ Schmidt being a psychologist rather than a historian, did not use a historical method to write the text, and did not have access to archive materials or oral history to inform his work. Savin-Baden and Howell Major also attempted to put together a history of the foundations of PBL in 2004, but their work was based on speculative resemblances of PBL principles with specific philosophical ideas; it did not use a historical method to derive relevant intellectual sources for PBL.¹² Given this gaping hole in the literature on PBL, I was tasked with researching and writing a comprehensive intellectual history of PBL as part of my doctoral programme at Erasmus University Rotterdam, under the guidance and supervision of Henk Schmidt and Maarten Frens.

In writing this intellectual history of problem-based learning, I initially proceeded on the assumption that it would be possible to uncover the 'true' meaning of PBL if I could get sufficiently close to the historical materials, and then hunt down its intellectual foundations strictly on the basis of what could explicitly be linked to the 'original' PBL model from McMaster. I had a very particular reason for doing this: to proceed the other way around, namely, to begin with intellectual foundations and derive from there a 'true' meaning of PBL would be a hopeless task. Where would one begin: with Rousseau's plea for leaving the child's good nature unadulterated? With Maria Montessori's play-based schools perhaps? Neither of these had any direct link to problem-based learning as far as one could tell but could of course all have in some ways informed the method; no idea is an island, entire of itself, to paraphrase the great English poet.¹³ But beginning an intellectual history of PBL thus would basically amount to writing an anthology of education philosophy, and since Palmer and Cooper have

⁹ For example : Allan Clausen, *Kampen for et nordjysk universitet* [The Battle for a North Jutland University] (Aalborg: Aalborg Universitetsforlag, 1984); Jes Adolphsen, *I Satte os I Jeres Baner: Interviews med 19 vigtige personer I AUC historie* [You put us in your tracks: Interviews with 19 important persons in AUC history] (Aalborg: Aalborg Universitetsforlag, 1984).

¹⁰ Else Hansen, *En koral i tidens strøm* [A coral in the flow of time] (Frederiksberg: Roskilde Universitetsforlag, 1997).

¹¹ Schmidt, 'PBL: Rationale and Description'; Henk G. Schmidt. 'A brief history of problem-based learning'. In *One-day, one-problem, an approach to problem-based learning*, ed. Glen O'Grady et al. (Singapore: Springer, 2012), 21-40.

¹² Maggi Savin-Baden and Clare Howell Major, *Foundations of Problem based Learning* (Maidenhead, UK: Open University Press, 2004).

¹³ The poem in question was written in 1624 by John Donne, under the title 'No Man Is an Island', in his collection *Devotions upon Emergent Occasions*.

already done a splendid job of it, this would be quite a futile exercise, and irrelevant to the purpose of this treatise.¹⁴

So the only realistic way to proceed was to first uncover what PBL actually was, historically speaking. Going about this sounded like a fairly straightforward exercise – one should first seek to uncover the original usage of the method, and from there derive the nature of the educational principles therewith attached. Unfortunately, but not unexpectedly, that project broke down almost immediately, when I paid my first visit to McMaster University in the autumn of 2012, sheltering from the tail winds of Hurricane Sandy in the rather dark basement of the Faculty of Health Sciences where the archives were kept. I was looking for an ‘essence’ of PBL, some guiding principles written in stone like the ten commandments – not only did I fail to find those, but I did not even find any mention of the word ‘problem-based learning’ recorded until 1974, that is five years after McMaster first started using the method to which the term referred! To this day, after four years of intensive research, I still cannot tell for certain who invented the acronym ‘PBL’, although I propose some theories in this treatise. Without a defined, specifically dated concept to hang onto, the education method later known as problem-based learning appeared as a free-for-all of ideas from various people with various interests all loosely joined into a hodgepodge curriculum from which principles were as difficult to untangle as balls of twine thrown into a tumble dryer. After the initial flustered disconcert, I realised that the impossibility of any aspiration to a black-and-white history of PBL actually liberated this research from the teleological danger, and instead freed it up for a ruthlessly inductivist approach, informed by tinges of social constructivism and critical theory. Without reverting to the ‘philosophy-led-to-PBL’ fallacy, I saw instead the advent of PBL as a process of clashes between ideas and practices, spawning new ideas which in turn spawned new practices over a couple of decades, in what was more of a constructed mosaic than a golden standard.

The task of this research then became to assemble the pieces of this mosaic; to weave a coherent narrative for the intellectual debates enmeshed in the inception of PBL, based on solid historical evidence. The purpose of that narrative would be to highlight that far from a straightforward intellectual filiation, PBL was the product of intellectual disputes, personal idiosyncrasies, philosophical beliefs and pragmatic considerations.

One might legitimately ask: if there is no clearly defined ‘original’ version of PBL, why does this book begin at McMaster in 1963? Why not, as some have suggested during my research, begin instead during the troubled years of Paulo Freire, where a university curriculum oriented around social problems was tentatively brought into being in Brasilia in 1962, until it was closed down during the military overthrow in 1964?¹⁵ Additionally, some might ask why this book gives disproportional attention to McMaster and Maastricht, with a relatively less dense analysis of the so-called Aalborg model of PBL, or other iterations of PBL. These are fair

¹⁴ Joy Palmer and David E. Cooper, *Fifty major thinkers on education: from Confucius to Dewey* (London: Routledge, 2001).

¹⁵ Henning Beck and Mette Müller, *The Room of Maneuver (sic) of an Institution: the case of the university*. Final Thesis, International Development Studies (Roskilde, Denmark: Roskilde University Centre, 1992).

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questions, and call for a justification of the choices made in this research. In short, I chose to study the programmes that fulfilled the following criteria:

1. *They explicitly refer to themselves as ‘problem-based learning’.* This criterion excluded programmes such as the one in Brasilia, or Bremen, which purported to use social problems, but never associated themselves with problem-based learning. I also chose to exclude exotic acronyms such as ‘Team Based Learning’ or ‘Practice Based Learning’. PBL in this book always means problem-based learning. The only exception made to this criterion is for the problem-oriented programme at Roskilde University, included because its history is inextricably tied to that of its younger sister in Aalborg, which does call its method ‘PBL’.
2. *They offered a pioneering interpretation of the use of problems in education.* This criterion excluded programmes that simply borrowed from McMaster or Maastricht without in some way significantly evolving the method in new directions. This also excluded the vast majority of project-based programmes, which were not so much problem-oriented but merely practice-based.
3. *They have a rich intellectual history.* Some programmes have made interesting adaptations of PBL and novel use of problems, but although they would indubitably form part of the history of PBL, if changes were not embedded in some form of intellectual or philosophical debate but instead purely down to practical reasons, then they were not deemed to be a part of the *intellectual* history of PBL.

These criteria might seem arbitrary considering that there are over 500 PBL programmes in existence today, but they were best suited the purpose of this book, which is to write a history of ideas, not of events.

Based on these criteria, one is left with a nicely limited selection of programmes to study. Without a doubt, the first and foremost programme to satisfy all three was McMaster University School of Medicine’s pioneering medical education curriculum of 1969. It should not come as a surprise to the reader then that the largest part of this book is dedicated to unravelling the various ideas and inputs that fed into the first programme to call itself ‘PBL’ – even if it did so *post-hoc*. From there, the choice became harder and required more research, but it soon became evident that there was much more to Maastricht University’s Faculty of Medicine than just a mere copy of the McMaster programme. Indeed, endowed with its own particular intellectual influences, some of Maastricht’s thinkers often found themselves at odds with ideas brandished at McMaster, and shedding light on these disputes will I hope, enlighten many a PBL educator who might be confused by various interpretations of PBL. Including Aalborg University into this history was the subject of much discussion, but in the end, although it has historically nothing to do with McMaster, its project-based brand of PBL indubitably did fit all three criteria, despite its very late adoption of the term, and so it was also included as a point of comparison, and to answer once-and-for-all the question: to what extent is this new project interpretation of PBL in line with the programme at McMaster and Maastricht?

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This book is structured not so much in terms of chronological linearity but rather as analytical discussions around interesting historical questions. To pick up our knitting metaphor, I have proceeded to untangle these historical questions like picking apart a tangled ball of twine: one strand at a time. Some of these questions had straightforward answers, others required much interpretation, and even sometimes, due to the lack of evidence, some guesswork. For both McMaster and Maastricht, the discussion is structured in two distinct parts: a first chapter is dedicated to historical questions surrounding the development of the PBL programme itself, the people involved, the educational innovations brought forth, the specificities of the programme compared with traditional education and with other innovative educational systems. A second chapter attempts to reconstruct the intellectual debates that shaped the school's particular interpretation of PBL, based on actual discussions between people from McMaster or Maastricht recorded in the archives. These debates are illustrated with explanations of the theories in questions – for instance, as the books of the behaviourist Robert Mager were brought into the McMaster arena as a point of discussion among the staff there, I have expounded Mager's work for the reader to fully understand the implications of this discussion. I have done the same for every author or influence cited at either McMaster or Maastricht, giving the reader an idea of how the works were interpreted, but also how they might otherwise have been or could be interpreted by future PBL educators; the purpose being not only to write history but also to enable educators to think about their own use of PBL, now and in the future. The final part of this book offers a brief history of the Danish model of problem-orientation from its introduction in 1972 in Roskilde to Aalborg's decision to use the terminology 'PBL' in the 1990s. I then propose an in depth analysis of the similarities and differences between the Danish models and McMaster-Maastricht PBL from a historical, philosophical and organizational perspective before closing on the debate of whether the Aalborg model fits within the umbrella of 'PBL'. The final chapter of the book sets itself apart from the rest in that it leaves behind a strictly historical perspective to carve out a philosophical reflection on the need to redefine self-directed learning as the heart of PBL. Although the book reads best from start to finish, the reader who is merely interested in the theoretical underpinnings of PBL may simply refer to chapters 2 and 4.

The work of the historian requires a thorough investigation and interpretation of evidence to construct a sound historical narrative. The following section details the means by which evidence was collected and then analysed to produce the narratives of parts 1 and 2 and the thematic studies in Part 3 of this treatise – starting with the theoretical underpinnings of the methodological choices made here, and continuing with detailed descriptions of the actual collection and analysis processes.

Data Collection

Data in historical research is unlike data in most empirical fields of study in that, with the exception of oral history, the data is not generated but uncovered: the historian has no control over the production of the data and relies on what has already been written by witnesses and participants to historical events. These written testimonies must be uncovered and made sense of – and the uncovering can be as difficult, if not more difficult than the interpretation. Thus, as an academic discipline, History suffers from incomplete data. The data that historians work with is referred to as *sources* – which derives from the Latin *sugere*, meaning ‘to rise’. The etymology of the word is interesting; echoing, to the more imaginative among us, spectres in the fog of history rising to whisper their secrets in the researcher’s ear. Howell and Prevenier define historical *sources* as follows:

Sources are thus those materials from which historians construct meanings. Put another way, a source is an object from the past or testimony concerning the past on which historians depend in order to create their own depiction of that past. A historical work or interpretation is thus the result of this depiction.¹⁶

Sources fit in two categories: primary and secondary. Primary sources can be physical (artefacts & remains), written or oral, but Anthony Brundage, in *Going to the Sources*, further sub-divided written primary sources in two groupings. Firstly, there are manuscripts, which he defined as ‘handwritten or typewritten record or communication that has not been printed or otherwise duplicated in significant quantities for public dissemination’¹⁷ and secondly, published sources, which are contemporary texts originally intended for publication or manuscripts that were published *a posteriori*.¹⁸ Recent history adds the possibility of using another form of primary source: oral accounts (which we shall see in detail further on). The research conducted for this treatise makes use of all three forms of primary sources described here.

Secondary sources, by contrast, consist in books, essays and articles written by historians or researchers from other disciplines about a historical topic. Thus, there is already a layer of interpretation between the data and the researcher. An interesting categorization challenge arises when authors formerly involved in historical events write their memoirs or their own historical accounts of those events – should this be considered a primary or a secondary source?

¹⁶ Martha Howell and Walter Prevenier, *From reliable sources*, 1st ed. (Ithaca, NY: Cornell University Press, 2001), 19.

¹⁷ Anthony Brundage, *Going to the sources*, 1st ed. (Wheeling, IL: Harlan Davidson, 2008), 19.

¹⁸ Brundage, *Going to the sources*, 20.

Brundage suggests that memoirs should be considered as primary sources, with due caution given to the inevitable ‘after-the-fact’ reconstructions.¹⁹ In that regard, they may not be much different to oral history accounts. However, a book such as Bill Spaulding’s *Revitalizing Medical Education*, which was written by an eye-witness to the programme but makes use of archive materials and oral history in its own right, poses all sorts of categorization conundrums which we need not delve into.²⁰ Suffice to note that for the purposes of this treatise, given the temporal distance between the events and the time of writing, such publications were treated as secondary sources.

Barton suggested that there might be a bias in favour of primary sources in historical work, at the expense of secondary sources, because of a (misguided) notion that they might be more ‘pure’.²¹ He debunked this ‘myth’ by reminding us that secondary sources have already collated, compared and analysed a great number of primary sources and are thus, without being totally free of bias (no written work can ever be), elevated to a more neutral standing than a typical primary source would be. Given that I tend to agree with this stance, the choice to work mainly with primary sources in the two historical sections of this treatise (Parts 1 and 2) did not spring from a particular ideological antipathy towards secondary sources, but rather from a remarkable lack of the latter! Indeed, presenting a historiography of McMaster and Maastricht’s problem-based learning programmes beyond what I have done in the introduction would be a rather short affair. Thus, my analysis of McMaster and Maastricht’s programmes and their philosophical and intellectual foundations relies chiefly on primary sources, which the following section describes by source-type. For each of these source-types, I give a brief background before describing the data collection process. I finish by explaining the methods of analysis of this data.

Archive Materials

Mike Featherstone illustrated in the following quote just how deep the ties between the historian and the archive goes:

Yet once in the archive, finding the right material which can be made to speak may itself be subject to a high degree of contingency – the process not of deliberate rational searching, but serendipity. [...] In this sense ‘the archive is also a place of dreams’ (Steedman, 1998). It offers the delights of discovering records and truths that have been hidden or lost, of resurrecting the past. Here the archive is a place for the researcher both to be alone and at home.²²

Fortunately, McMaster University is endowed with a well-kept archive and a professional archivist, which considerably simplified the hunt for relevant documents and left more time for oneiric musings about the material. What’s more, it seems that almost everything of relevance, up to and including hand-written notes, three-line letters and telegraphs, and every record of minutes for every Education Programme Committee meeting from 1966 onwards has

¹⁹ Brundage, *Going to the sources*, 21.

²⁰ Spaulding, *Revitalizing Medical Education*.

²¹ Keith C. Barton, ‘Primary sources in history: Breaking through the myths’, *Phi Delta Kappan* 86, no. 10 (2005): 745–753.

²² Mike Featherstone, ‘Archive’, *Theory, Culture & Society* 23, no. 2-3 (2006): 594.

METHODS

meticulously been sorted, labelled and filed away. Thus, over a period of two weeks, I was able to parse through a considerable amount of files.

The archival records of Maastricht University were somewhat more dispersed. Initially, I collected materials personally from key members of the Faculty of Medicine during and after my visit in April 2013. The largest share came from the personal collection of Henk Schmidt. However, given that these were personal collections, the distribution of these documents was necessarily quantitatively biased towards the work of the owners of said documents. Finding a more neutral sample of documents took some effort – the archives of Maastricht University itself focused almost exclusively on administrative matters at the level of the *College van Bestuur* (University Board), which were of little educational interest. Henk Schmidt eventually uncovered the largest and most useful collection of archives at the *Rijksarchief* (State Archives) in Limburg located in Maastricht and we sorted through the papers there in the course of two visits.

At both McMaster and Maastricht, the types of archival materials uncovered are as follows: administrative documents; commentaries on other people's memos; correspondence between members of Faculty; course material; memoranda sent to the McMaster Education Programme Committee and *Onderwijs Commissie* (Education Commission of Maastricht); minutes of the McMaster Education Programme Committee; PBL problems; proposals; reports & draft reports; unpublished papers; five interviews conducted with the Founding Fathers of McMaster between 1979-1980.

Once I had selected all of the papers of interest to me, I had them photocopied and thus had copies of all of the relevant archives to work with throughout the research.

The archives of Maastricht University posed an extra challenge given that around 90% of the documents were in Dutch. Most were written in a form of spelling now disused in the Netherlands, rendering their analysis even more difficult for a non-native Dutch speaker. Whilst it would have been possible for me to process all of these documents on my own, it would certainly have extended the time of research by at least a year – I therefore opted to work with two student translators both native Dutch but bilingual in English, as mentioned in the acknowledgements section. We worked on the translations side-by-side so that I could check at all times that the meaning made sense in the context of the document. Acknowledging that these translations were not done by professional translators (this would have been financially impossible for over 500 pages of text), this thesis will present the original Dutch transcripts when required, and offer our translation as a footnote.

Regarding the Danish texts, Roskilde University had an archive, but Aalborg University did not. This meant that at Aalborg University I had to make use of the conventional library and whatever people still kept stockpiled in their offices. Fortunately, this method still yielded quite a number of papers. Acquiring and then processing the material required two separate trips to each institution: indeed, as the texts, including the names of the files were in Danish and my knowledge of the language consists in making educated guesses based on a limited knowledge of Dutch and German, I realised after my first visit that although I had photocopied a large number of archive materials that looked interesting from the titles, I could not work on them

on my own. So on my second trip I worked together with historians and philosophers from both institutions to translate the documents. They would translate the table of contents, I would select what I thought was interesting, and then they would read to me what was in the passages I had selected, and where necessary provide literal translations, while I took notes. Although this process was intense and laborious, we managed to process a remarkably large number of papers in a short period of time in this manner.

Oral History Accounts

The Oral History Association defines oral history as ‘a field of study and a method of gathering, preserving and interpreting the voices and memories of people, communities, and participants in past events’.²³ Oral history is thus a method of data collection based on interviews conducted by the historian with people who witnessed or participated in historical events.

One of the key challenges of this method is its essentially human element, which tends to blur the lines of scientific objectivity. Paul Thompson noted this particularity in his reflections on the practice of oral history, comparing it to a form of therapy or psychoanalysis for the interviewees. To that effect, Thomson suggested that the relationship between the interviewer and the interviewee cannot be neutral – the former inevitably finds himself drawn into the human story that he is piecing together as he co-constructs memories with the latter:

Every historical source derived from human perception is subjective, but only the oral source allows us to challenge that subjectivity, to unpick the layers of memory, dig back into its darkneses, hoping to reach the hidden truth.²⁴

Thus, embracing his position as an actor as well as an observer, the interviewer can understand the experience of oral history as ‘not only intellectual stimulation, but sometimes, through entering into the lives of others, a deep and moving human experience’.²⁵ Alessandro Portelli, in his work on an oral history account of the life and times of Italian Americans, summarized the relational processes involved in this method of data gathering:

Oral history is a work of relationships: in the first place, a relationship between the past and the present, an effort to establish, through memory and narrative, what the past means to the present; then, a relationship between the interviewer and interviewee, and between the oral form of the narrative and the written or audio-visual form of the historian’s product.²⁶

Thompson and Portelli’s acceptance of the co-constructed nature of oral history echoes Fontana and Frey’s subjectivist stance on the use of interviews in qualitative research. They argue: ‘much of traditional interviewing concentrates on the language of scientific neutrality and the techniques to achieve it. Unfortunately, these goals are largely mythical’.²⁷ Given this, Fontana

²³ ‘Oral History: Defined’, Oral History Association, accessed July 22, 2014.

<http://www.oralhistory.org/about/do-oral-history/>

²⁴ Paul Thompson, *The voice of the past*, Kindle Ed. (Oxford: Oxford University Press, 2000), 173.

²⁵ Thompson, *The voice of the past*, 190.

²⁶ Alessandro Portelli, ‘What Makes Oral History Different’. In *Oral history, oral culture, and Italian Americans*, 1st ed. ed. L. Del Giudice (New York: Palgrave Macmillan 2009), 21.

²⁷ Andrea Fontana and James Frey, ‘The Interview: From Neutral Stance to Political Involvement’ in *The Sage Handbook of Qualitative Research*, 3rd ed., ed. Norman K Denzin and Yvonna Lincoln (Thousand Oaks: Sage Publications Inc. 2005), 696.

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and Frey note an imbalance in the highly meaning-laden process of interviewing – namely that the researcher has the ultimate responsibility for and exclusive privilege of stitching together an account from his data. This imparts on the researcher a duty to question thoroughly and systematically to get to the bottom of the issue under investigation. However, no depth of questioning can guarantee an unambiguous outcome – asymmetries in information between interviewer and interviewee necessarily mar the interview process.

By nature (and self-evidently), oral history is only suited for periods of investigation situated within living memory. Although the five Founding Fathers of McMaster University School of Medicine and the two founders of Maastricht Faculty of Medicine had either passed away or were too ill to be interviewed at the time that this research was conducted, there were still many people potentially available for interview who played a role or were at a vantage point to witness the early years of McMaster and Maastricht. Of particular interest were administrators, tutors and students of the first class (1969-1972 for McMaster, 1973-1976 for Maastricht), but also administrators who organised the transition to the second iteration of McMaster's medical curriculum from 1977 onwards. However, given that the events of interest took place over 40 years ago, finding these people was no mean feat. In addition, identifying a representative range of people to interview was a challenge – firstly, because many of the actors in this history are no longer alive; secondly, because some have moved away and can no longer be found; and thirdly because as an external researcher, foreign to the culture and history of both institutions, I would not be aware of existing factionalism or other divisions among the participants that might taint their story.

At McMaster, I thus initially relied on the help of Geoffrey Norman, Assistant Dean for the Programme for Education Research and Development at McMaster University Faculty of Health Sciences at the time of the research, who was able to identify relevant people and arrange meetings. By a stroke of luck, my visit to McMaster University coincided with the 40th anniversary reunion of the class of '72, and thus I was able to contact and arrange interviews with former students and tutors with greater ease than would otherwise have been possible. As my research progressed, I was able to identify other people of interest either by repeatedly encountering their name in the archives, or by hearing their name spoken often by other interviewees. Thus, over the course of the year that followed my initial work at McMaster, I pressed my existing contacts at the Faculty of Health Sciences to lead me to these newly unearthed sources. Although I was able to see a good proportion of my interviewees face to face, this was not possible in all cases – particularly where the people in question had moved away from Hamilton. Thus, I also made use of telephone interviews in those cases.

At Maastricht University, I was assisted by Diana Dolmans, professor of innovative learning arrangements at the Department Health, Medicine and Life Sciences, Educational Development and Research. She made arrangements for the meetings based on a list of contacts compiled by Henk Schmidt. Additional names were given to me by some of my interviewees, and I either met these people later, in Rotterdam, or used Skype.

At Roskilde, I was put in direct contact with one of the founders of the programme, Henning Salling Olesen, who was still in close contact with a lot of people who were active in

establishing the university. At Aalborg, the list of contacts was put together initially by Diana Stentoft, now in the Department of Health Science and Technology, for my first visit, but when I returned to Aalborg in summer 2013, Claus Spliid from the Department of Planning arranged the rest of the interviews. I was able to speak to my interviewees throughout both of my visits. In most cases, language was not an issue but when it was, another person whose Danish-to-English translation was more fluent assisted me.

Interviews generally lasted between 45 minutes and two hours, depending on the importance of the person's role at the time of the events, and the quality of the person's recollections. I recorded all interviews with the interviewee's permission on a recording device, or with a call recording programme in the case of phone interviews. As noted by Robin Longhurst, recording allows the researcher to focus on the substance and direction of the conversation rather than on

List of Semi-Structured Interview Themes	
1.	Historical background of the programme and the interviewee's role in this.
2.	The role of particular individuals in the programme.
3.	Programme philosophy & intellectual influences.
4.	The nature of problems.
5.	The role of teachers & influence of students.
6.	The importance of acquiring 'skills' versus the content of medicine.
7.	Interdisciplinarity
8.	Assessment
9.	Community-orientation of the programme

taking notes – and these interviews certainly required levels of concentration that would have been impossible to achieve whilst taking notes.²⁸ I did carry a notebook at all times, which I would let participants use if there were complex names to spell out, or any diagrams that they wished to draw. Not many of them took up this opportunity at McMaster, but this device was particularly useful in the Dutch part of my research.

During the interviews, I used a semi-structured interview technique, with a

list of themes to cover, which I prompted interviewees to talk about, although I did not stop them from bringing up topics that were not on my list if they felt that these were important. Sometimes, interviewees would naturally lead me to a theme, which was further down my list. In that case, I let them carry on, and returned to the order of the list later.

The first interviews were challenging as I struggled with the role of co-constructor in the narrative. Some of the participants were endowed with strong, occasionally defiant personalities that were difficult to steer, especially at the start of a project where I, as the researcher, did not possess enough knowledge to grasp my interviewee's memory-world. The more data surfaced from archive and oral history research, the more the quality of the interviews improved. There was, fortunately, the opportunity to improve the quality of the first few interviews by means of written correspondence or additional phone calls with the participants. The point made earlier by Thompson certainly rang true: the iridescence of human memory is a discombobulating perturbation for those in search of 'irrefutable' historical evidence. Being confronted with contradictory accounts, sometimes even self-contradictory accounts, can generate feelings of frustration and exasperation from both sides, which transpire

²⁸ Robyn Longhurst, 'Semi-Structured Interviews and Focus Groups' in Nicholas Clifford & Gill Valentine, *Key methods in geography*, 1st ed. (London: SAGE, 2003), 103-113.

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in the conversational interviews. As the research progressed, the ideal of a unified historical reality waiting to be uncovered crumbled, and a kaleidoscopic picture of fragmented memories – often incomplete – emerged instead. What was lost in clarity and simplicity, however, was gained in richness.

After the interviews, each account was carefully transcribed. The transcription was, as far as practical, verbatim, although since this research project is not focused on discourse analysis or phenomenology, speech particularities, onomatopoeias and repeated words were not noted down. After transcription, the transcripts were sent to each of the participants, who had the opportunity to read through and edit out anything that they did not wish to be quoted on. Some participants took this opportunity to add notes to the transcript, others never replied. Thus, my transcripts were more than the ‘considerable reduction of the almost infinitely rich primary and secondary data’ observed by Kowal and O’Connell.²⁹ They were co-constructions in their own right, adding another layer of construction atop the oral history. Once the transcripts were agreed upon between the researcher and the interviewee, they could be used for analysis.³⁰

²⁹ Kowal, Sabine and Daniel C. O’Connell, ‘The Transcription of Conversations’. In *A companion to qualitative research*, 1st ed. ed. Uwe Flick, Ernst von Kardorff and Ines Steinke (London: Sage Publications, 2004), 249.

³⁰ Interviewees who did not respond after their transcript was sent to them were assumed to agree to it, since they were aware of my methods and agreed to being recorded and transcribed.

List of Interviewees (in Alphabetical Order)

McMaster University Interviewees

Mohammed Ali

Interviewed on 30th October 2012 at McMaster University

Dr. Ali trained as a medical doctor in Cairo, Egypt and was recruited by Dr. Fraser Mustard to start work at McMaster University School of Medicine in 1970 as a Unit Planner for Haematology and a Problem based learning tutor. In the mid-1970s Dr. Ali took over chairmanship of phase III. As Unit Planner and Phase Chairman, Dr. Ali participated in and contributed to the Education Committee. To this day, he still tutors PBL groups at the School of Medicine.

Ralph Bloch

Interviewed on 23rd October 2012 in Hamilton, Ontario.

Dr. Bloch was the oldest of the first group of 20 students which joined McMaster University school of medicine in 1969, when it opened its doors. Hailing from Switzerland, he came to Canada in 1968 as an employee of McMaster University's Physics department. Through fortuitous contact with Dr. Fraser Mustard (their offices were adjacent), Dr. Bloch decided to apply to medical school. He was one of the student representatives who sat on the Education Committee.

John D. Hamilton

Interviewed on 12th November 2012 via Skype

Dr. Hamilton, a British gastroenterologist, was recruited to McMaster University School of Medicine from the United Kingdom by Dr. Moran Campbell in April 1969 (although he appeared in Education Committee meetings as a guest as early as October 1968) He was hired as Assistant Professor of Medicine and Academic Director of Clinical Gastroenterology, but during his time at McMaster also became Chairman of Phase III, then Chairman of the Undergraduate Curriculum Committee. He was an active contributor to the Education Committee and authored a critique of the programme published in 1976³¹. Dr. Hamilton left McMaster in 1977 to help set up sister PBL programmes in the Developing World and Australia. He later became Dean of the University of Newcastle Australia School of Medicine, which was the first school to adopt PBL in Australia.

James D. Kraemer

Interviewed on 20th November 2012 via Skype

Mr. Kraemer was recruited by Dr. William Spaulding and joined the staff of McMaster University in the spring of 1968 as Education Coordinator. He was previously involved in the governance of the University of Waterloo. Mr. Kraemer was present at almost every Education Committee meeting between 1968 and 1973, and diligently produced the minutes thereof during the entire period. He served to coordinate the different committees, sub-committees and the Education Committee. Mr. Kraemer left McMaster University at the end of 1973.

Arthur Leader

Interviewed on 30th October 2012 via Skype

Dr. Leader was part of the first group of 20 students which joined McMaster University school of medicine in 1969, when it opened its doors. Dr. Leader had a background in Economics at the University of Toronto before joining the Medical School. He was also active in student movements and protests during his time in Toronto. He was one of the student representatives who sat on the Education Committee.

C. Barber Mueller

Interviewed on 25th October 2012 in Hamilton, Ontario. Interview done in the presence of Dr. Geoffrey R. Norman.

Dr. Mueller is an American surgeon who became McMaster School of Medicine's first Chair of Surgery. Dr. Mueller often participated in and occasionally contributed memoranda to the Educational Committee. Although he was not actively involved in the programme design, he was extremely interested in medical education and ran Saturday morning remedial classes for students who struggled with the contents of the programme. Dr. Mueller is considered one of the Founding fathers of McMaster Medical School and his name & role are referenced in

³¹ John D. Hamilton, 'The McMaster Curriculum: A Critique', *The British Medical Journal* 1, no. 6019 (1976): 1-7.

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W.B. Spaulding's chronicle of the programme.³² Dr. Mueller authored his own short history of the programme in 2008.³³ He passed away in early 2014.

Victor Neufeld

Interviewed on 26th October 2012 at McMaster University

Dr. Neufeld trained as a specialist in internal medicine at the University of Toronto, and first joined the Education Committee of McMaster School of Medicine as a guest in 1970. Dr. Neufeld undertook a Masters of Medical Education at Michigan State University before joined McMaster School of Medicine on a full-time basis. During his time at McMaster, Dr. Neufeld set up the school's first Programme for Educational Development. He later became M.D. Programme Chair, and during that time orchestrated the reform of the curriculum, which took place in the early 1980s. He subsequently became Associate Dean of the School. Dr. Neufeld was very involved in McMaster's international activities, in particular with the setting up of McMaster's sister school in Maastricht, Netherlands. Dr. Neufeld authored a few of the early papers on the medical programme³⁴. He remained at McMaster until 1997.

Geoffrey Norman

Interviewed on 20th October 2012 at McMaster University

Dr. Norman came to McMaster University as a nuclear physicist, and in 1971 was recruited to assist Dr. Neufeld in setting up the Programme for Educational Development. In the mid-1970s, he undertook a Masters in Medical Education at Michigan State University. His role in Education Research and Development grew until his major involvement in the 1993 and 2006 curriculum reforms. At the time of writing, Dr. Norman is the Assistant Dean for the Programme for Educational Research & Development at the School of Medicine.

Dave Sackett

Interviewed on 25th October 2012 via Skype

Dr. Sackett joined McMaster University in 1967 as Chairman of Epidemiology and Biostatistics. He was responsible for organizing the "Horizontal Programme" and joined the Education Committee in 1968. He contributed extensively to the Education Committee and throughout the 1970s produced a large quantity of memoranda which form the basis of many of this thesis' arguments. Dr. Sackett reduced and finally ended his involvement in the Education Committee at the end of the 1970s to focus on developing Evidence-Based Medicine, for which he is most renowned today. Dr. Sackett is considered one of the Founding fathers of McMaster Medical School and his name & role are referenced in W.B. Spaulding's chronicle of the programme and Dr. Mueller's short paper on the history of the School.

E. Kinsey Smith

Interviewed on 10th July 2013 via Skype

Dr. Smith, a British nephrologist, was recruited from Hammersmith Hospital in London by Dr. Moran Campbell in July 1969 as Head of Nephrology and immediately joined the Education Committee. He later became Chair of Phase III, and some time afterwards became involved in planning in the Clinical Clerkship. He later became Associate Dean for Education. He contributed actively to the Education Committee throughout the 1970s and early 1980s and produced a large quantity of memoranda during that period which serve as the basis of many of the arguments made in this thesis. Dr. Smith retired from McMaster in 2000.

George Sweeney

Interviewed on 25th October 2012 via Skype

Dr. Sweeney was recruited to McMaster University by Dr. John Evans from his native South Africa in 1968, although in the year leading up to the opening he also held a fellowship in physiology at Columbia University. His first responsibility was to set up and supervise the biological sciences courses for the summer programme for incoming students. As such, he was involved in Education Committee discussion in the late 1960s and early

³² William B. Spaulding, *Revitalizing Medical Education, McMaster Medical School the Early Years 1965-1974* (Hamilton, ON: B.C. Decker Inc, 1991).

³³ C. Barber Mueller, 'McMaster University Medical School: The Little School that Could – and Did', *McMaster University Medical Journal* 5 no. 1 (2008): 29-33.

³⁴ Victor R. Neufeld and William B. Spaulding, 'Use Of Learning Resources At McMaster University', *The British Medical Journal* 3 no. 5871 (1973): 99-101.

William B. Spaulding & Victor R. Neufeld, 'Regionalization Of Medical Education At McMaster University', *The British Medical Journal* 3, no. 5871 (1973): 95-98.

Victor R. Neufeld and Howard S. Barrows, 'The "McMaster Philosophy": An Approach to Medical Education', *Journal of Medical Education* 49 (1974): 1040-1050.

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1970s. Dr. Sweeney was also heavily involved in tutoring throughout his time at McMaster. He retired from the School of Medicine in 1996.

Maastricht University interviewees

Pie Bartholomeus

Interviewed on 13th October, 2015 at Erasmus University College

Bartholomeus was recruited by Evert Reerink in January 1975 to research quality assurance in general (medical) practice. From the first day of his employment, he was involved with the planning of the *Skillslab*. He was appointed head of the *Skillslab* after the resignation of Leon Lodewick in Spring 1976 while continuing his work with Reerink in Healthcare Research. He retired recently after a long career in developing skills training both at home and abroad.

Peter Bouhuijs

Interviewed on 16th April 2013 at Maastricht University

Bouhuijs left Eindhoven, where he was doing research on problem-solving in mathematics to join Maastricht in the summer of 1975, just prior to the arrival of the second cohort of students. Given his training in cognitive psychology, he joined the Department of Educational Development and Research, where he teamed up with colleague Henk Schmidt to produce the first research on Problem-based learning under the (loose) supervision of Wynand Wijnen, and where he eventually received his PhD. This work led him to co-author the first Dutch-language publications on PBL. Additionally, Bouhuijs was actively involved in various international endeavours such as the implementation of PBL at Suez Canal University in Egypt, together with Schmidt.

Job Cohen

Interviewed on 4th September 2013 in Rotterdam

Cohen had been working in legal education at the Education Centre of Leiden University for 10 years when he caught wind of the educational experiment in Maastricht. Being acquainted with Wynand Wijnen, he arranged a visit to the Faculty of Medicine in the late 1970s. This visit was so transformative that he published a paper imagining the application of PBL in legal education, and in 1981, Cohen and colleagues from Leiden and Groningen set up a commission to build the new Faculty of Law at Maastricht University – the first Faculty that was unrelated to health sciences. The Faculty opened in 1983 and Cohen became its Dean. In 1991, Cohen became the Rector Magnificus of Maastricht University.

Erik de Graaff

Interviewed on 9th January 2013 at Aalborg University

Erik de Graaff joined the Maastricht faculty in 1979 as an education researcher and lecturer. With a background in psychology, Erik conducted research on evaluation and assessment in higher education under the supervision of Drs. Drop and Van Berkel. He left Maastricht in 1989, and after a period working on the implementation of PBL at Delft Technical University, he joined Aalborg University as a guest professor in 1999, becoming *Adjungeret* professor in 2007.

Gerard Majoor

Interviewed on 22nd April 2013 at Maastricht University

Majoor, a biologist by training, was brought into the Faculty of Medicine in time to prepare for the arrival of the first students in the summer of 1974. At the time, Majoor was still preparing a PhD thesis under the supervision of the future Dean of the Faculty of Medicine, Prof. Willighagen. From the start, he tutored, planned and coordinated various blocks of the curriculum in particular in the first year – but one of his biggest involvements was as a representative of Maastricht within the so-called “Network of community-oriented educational institutions for health sciences” – a group of community-oriented schools gathered under the umbrella of the World Health Organization.

Job Metsemakers

Interviewed on 16th April 2013 at Maastricht University

Job Metsemakers joined the first cohort of students at the new Faculty of Medicine in 1974, before its University status was even approved. As a 3rd year student, Metsemakers became a tutor to the 1st year students. He actively participated in various planning groups and committees for curriculum development, and even went to visit McMaster during an elective in Rockford, USA. After graduation, Metsemakers worked as a family physician in parallel with a part-time position at Maastricht University. At the time of the interview he was a Professor in Family Medicine at Maastricht University.

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Evert Reerink

Interviewed on 31st May 2013 via Skype

Reerink, joined the soon-to-be Faculty of Medicine in 1973, before its opening, and left again in 1979, only to return in the 1990s. Initially, Reerink was hired to assist the Department of Education Development in curriculum planning, under the supervision of Wynand Wijnen. Later, he headed the Capacity Group on Health Services, while continuing his research on problem-orientation in medical education. Reerink was also initially involved in the development of the Skillslab.

Rob Reneman

Interviewed on 18th April 2013 at Maastricht University

Although Reneman was originally trained as a cardio-anaesthesiologist, he transitioned to basic sciences as a physiologist, and joined Maastricht in that capacity in 1974 to set up a biomedical research programme with his colleague Coen Hemker. Together, they were the first basic scientists involved at the new Faculty of Medicine. Reneman was the first Chair of Physiology, while his colleague was the first Chair of Biochemistry. Reneman eventually started the Cardiovascular Research Programme, later converted to the Cardiovascular Research Institute of Maastricht (CARIM).

Jan Rosing

Interviewed on 17th April 2013 at Maastricht University

In 1976, Amsterdamer Jan Rosing returned from the United States, where he was completing a post-doctoral contract in biochemistry, to join the Limburg Faculty of Medicine. Rosing succeeded Coen Hemker as Chair of Biochemistry. Although he was not very active in teaching in the 70s, save for tutoring a few groups, he soon joined a Block Planning Group and eventually became Block Coordinator and Year Coordinator in the 1990s.

Henriette ‘Hetty’ Snellen

Interviewed on 16th April 2013 at Maastricht University

Snellen practiced family medicine prior to her arrival at Maastricht University in 1976, where she was hired to help with medical education and curriculum design. She has worked in at the Faculty of Medicine in that capacity ever since, overseeing the change to the *Rode Draad* curriculum in the 1990s.

Anton Schmidt

Interviewed on 18th April 2013 at Maastricht University

Anton Schmidt was hired just prior to the arrival of the first cohort of students in 1974. As a medical psychologist, he fitted in the Maastricht policy of including social sciences and psycho-social factors in medical problems. Given his background, Schmidt was involved in the foundation of the Department of Medical Psychology. From the start, he also worked as a tutor, and as a block coordinator. He was also involved in “The Network”, working particularly in Kenya and the Philippines.

Henk Schmidt

Interviewed on 25th April 2013 at Erasmus University Rotterdam

Henk Schmidt was hired in 1974 to assist Wynand Wijnen in the Department of Educational Development and Research. His early work looked at the effects of the structuring of problems and distribution of work among students on the effectiveness of learning in problem-based groups, but he soon involved himself in the tutor training system. In 1976 he planned the training tutors and students alike in working with PBL, before this was taken over by his colleague Jos Moust. In this process, he developed the so-called “seven-step” method of PBL, which is still widely used today in the Netherlands and abroad. Together with his colleague Peter Bouhuijs, he authored the first Dutch-language publications on PBL, involved himself extensively in “the Network”, and developed strong connections with McMaster University, particularly through Vic Neufeld, Geoff Norman, and Howard Barrows. In addition to coordinating several blocks in the medical curriculum, Henk Schmidt was Chair of the Department of Educational Development and Research, Dean of the Maastricht Faculty of Health Sciences and involved in the founding of the Faculty of Psychology before leaving Maastricht to join the Erasmus University of Rotterdam, where he also implemented PBL in several faculties, eventually as Rector Magnificus.

Cees van de Vleuten

Interviewed on 15th April 2013 at Maastricht University

Van de Vleuten was a latecomer to the Faculty of Medicine, joining in 1982, but since then he has been an assistant, associate and full professor, Chair of the Department of Educational Development and Research and presently Director of the Graduate School of Health Professions Education. Van de Vleuten has a background in

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psychology, and focused his work on the assessment of professional competence, under the supervision of Wynand Wijnen.

Pauline Vluggen

Interviewed on 22nd April 2013 at Maastricht University

Pauline Vluggen joined the staff of Maastricht in 1976, as the secretary of Dean Tiddens. She carried on this duty under the deanship of Prof. Willighagen and later Prof. Greep, and was thus part of the administrative staff throughout the core period of the formation of the educational programme. From 1988, she was coordinating secretary of the “Network.” Currently, she is the Director of the Educational Affairs Office at Maastricht medical school.

Ger van der Vusse

Interviewed on 18th April 2013 at Maastricht University – due to time constraints interview was only 20 minutes.

As a physiologist, Van der Vusse was hired to contribute to teaching and research at the Faculty of Medicine in 1976, and experienced first-hand the consequences of the “non-expert tutor” policy of the Faculty. He was still working at the Faculty at the time of the interview.

Roskilde University interviews

Knud Illeris

Interviewed on 21st August 2013 at the Danish Pedagogical University in Copenhagen

Knud Illeris began his professional career as a travel agent, but in 1970, at the age of 33 became a student of psychology under the supervision of Jens Bjerg from the Danish Institute of Educational Research (DIER) in Copenhagen. As part of his PhD thesis, he studied Bjerg’s pioneering project programme at the Teacher Training College in Copenhagen, and the nascent problem-oriented curriculum at Roskilde University Centre. His thesis, published in 1974 as well as his later written work are considered the theoretical cornerstones of Danish Reformed University pedagogy, and is still very popular in Denmark today. His later works have been translated into English.

Jens Højgaard Jensen

Interviewed on 5th January 2013 at Roskilde University.

Jens Højgaard Jensen graduated in physics from Copenhagen University in 1970 and taught there until 1972. In 1972, he moved to RUC to take up a position as Assistant Professor of Physics. He was later Associate Professor of Physics, Dean of the Department of Natural Sciences, and Pro-rector of RUC between 1986 and 1992. He was then Head of the Natural Sciences Basic Education Programme 1997 – 2010.

Børge Klemmensen

Interviewed on 1st July 2014 at Roskilde University.

Børge Klemmensen met the founding Rector of Roskilde University Erling Olsen during his time as Chairman of the Student Council of Copenhagen University from 1969 – 1970, and the two also worked together in the *Konsistorium* (board) of Copenhagen University. As Chairman of one of the largest member organizations of the DSF, Klemmensen was also involved with DSF members such as Salling Olesen. At the invitation of Olsen, Klemmensen joined the interim board of RUC in 1970, and held the position of *Amanuensis* trainee until 1973. After his studies, he remained at RUC as a Lecturer, the Senior Lecturer. He was heavily invested in the political debates in the university until 1988, as Chairman of the Board of the Department of Environment, Technology and Social Studies. He retired from Roskilde University in 2010.

Henning Salling Olesen

Interviewed on 4th January 2013 at Roskilde University.

Henning Salling Olesen studied language and literature at Aarhus, then Copenhagen University before getting heavily involved with the DSF in 1967. In 1971, at the age of 25, he was chosen to represent the DSF in negotiations for the planned Roskilde University Centre as a member of the Founding Committee for the Humanities, at the same time as completing his doctoral thesis. In 1972, he held the role of student representative supporting newly enrolled students, and from 1973 onwards, was awarded a research scholarship at RUC where he held an Assistant Professor position in Social Sciences of Education. He remains at Roskilde University today as a Professor of Lifelong Learning.

Jørgen Rafn

Interviewed on 5th January 2013 at Roskilde University.

As a student at Copenhagen University, Jørgen Rafn was involved in the set-up of RUC to help build the Student Council there. In 1975, while still a student at Copenhagen University, he joined a project group at RUC on

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Vocational Education. Between 1976 and 1980, he worked as a student assistant in the research project 'Pedagogical Development work at the Danish Vocational Education' at RUC. In 1983, he joined RUC as a member of Faculty with the position of Teaching Assistant and in 1985, he became a fellow of the National Centre for Vocation Teacher Education. He is presently a Teaching Associate Professor in the Department of People and Technology at RUC.

Aalborg University interviews

Mona-Lisa Dahms

Interviewed on 14th January 2013 at Aalborg University.

Mona Dahms graduated from the Technical University of Denmark in 1971. In 1976 she joined as Associate Professor the Danish Engineering Academy, Department of Electronics, which was merged with the Technical College of Aalborg to form the core of the Faculty of Engineering and Science. She remained at Aalborg until 2009 when she took leave for personal projects. She returned afterwards as Associate Professor in the Department of Development and Planning.

Stig Enemark

Interviewed on 9th July 2014 via Skype.

Stig Enemark was a practicing land surveyor in his thirties in Copenhagen when he was invited over to Aalborg in 1980 as a project supervisor and lecturer at the Faculty of Technical and Natural Sciences. Enemark authored the first English language publication on the 'Aalborg model', describing the interpretation of problem-orientation and projects in the engineering programme. He is Professor of Land Management at Aalborg University, and affiliated to the Department of Development and Planning.

Finn Kjærdsdam

Interviewed on 10th July 2014 at Aalborg University.

At the time of the founding of Aalborg University, Finn Kjærdsdam was an Associate Professor in Urban Planning at the Royal Agricultural University in Copenhagen. With the founding of the university, his position was moved to Aalborg and he was affiliated with the Department of Planning. Kjærdsdam went on to become Dean of the Faculty of Engineering for 17 years, and later Rector of Aalborg University from 2005 – 2014. He is Professor Emeritus at the Department of Development and Planning.

Anette Kolmos

Interviewed 14th January 2013 at Aalborg University

Anette Kolmos joined Aalborg University Centre in 1976 as a student in Social Sciences and graduated in 1984 with a Masters in Social Sciences and Psychology. In 1989 she received her PhD at Aalborg on the subject of gender and technology. In 1994 she became an Associate Professor at the Department of Development and Planning. In 2007, she became the first Chairholder for the UNESCO Chair in Problem Based Learning in Engineering Education based at Aalborg University, shortly thereafter was made a Professor in Engineering Education and Problem Based Learning at Aalborg University. In 2014, she became the director for the Aalborg Centre for Problem Based Learning in Engineering Science and Sustainability under the auspices of UNESCO.

Lone Krogh

Interviewed 11th January 2013 at Aalborg University.

Lone Krogh was a student in the first cohort of students to join the Social Sciences programme at AUC in 1974. After her graduation, she left the university and only returned in the 1980s as a project supervisor and lecturer. She is an Associate Professor at the Faculty of Social Sciences and Head of the Higher Education Research Group.

Erik Laursen

Interviewed 11th January 2013 at Aalborg University.

Erik Laursen is a Professor of Pedagogics and Learning in the Faculty of Social Sciences, researching PBL at the interdisciplinary Department of Learning and Philosophy.

Palle Rasmussen

Interviewed 11th January 2013 at Aalborg University

An influential DSF member, Palle Rasmussen was originally involved in the setup of Roskilde. However, he migrated to the Aalborg project in early 1973 and was heavily involved there until February 1974 at which point he took a step back to finish his Master thesis. After finishing his studies, he joined RUC as a research fellow until

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1976. From the summer of 1977 until 1998, he returned to Aalborg University as Assistant, then Associate Professor of the Sociology of Education in the Faculty of Social Sciences. Between 1999 and 2003, he directed the Centre for the Interdisciplinary Study of Learning as a Full Professor. He is presently Professor of Education and Learning Research at the Department of Learning and Philosophy.

John Houman Sorensen

Interviewed 14th January 2013 at Aalborg University

John Sorensen was elected Chairman of the DSF from April 1971 to April 1972. He was then appointed by the Minister of Education as one of the eight members of the Interim-governing board for AUC, established February 1, 1973. In 1976, he became an assistant professor within the field of Educational Policy and Planning, and from 1979 to 1985, an associate professor in the same field. In the summer of 1985, he took leave from AUC and worked at the Technological Institute, Copenhagen. In February 1990, he officially left his position at AUC and became Head of the Research Department at SEL (The Danish National Institute for Vocational Pedagogics). In the summer of 1997 he received a 5-Year-Grant from The National Social Science Research Fund to a project on Lifelong Learning at CARMA, Centre for Labour Market Research at Aalborg University following which he returned to his position as associate professor in the field of adult vocational education, from 2002 until 2012, when he retired.

Analysing the data

Whewell's Inductive Method

Analysing historical data would pre-suppose a framework of analysis, like data from any other field of study. In that regard, many point to Foucault's work in the *Archaeology of Knowledge* as the golden standard for historical analysis.³⁵ It would be tempting, especially for a treatise on the intellectual history of PBL, to simply adopt Foucault's discourse analysis and deconstruct the conveniently continuous 'progress' of education philosophy from the days of Comenius to the student revolutions of the 1960s. Evidently, once read, Foucault's deconstruction of history's discontinuities and the institutionalised and discursive relationships that make up 'History' are hard to set aside. Nonetheless, this treatise will make no explicit use of foucauldian methods of analysis, or in fact of any form of phenomenology. Instead, I have chosen to construct this historical narrative using the Inductive Method. This choice crystalized during a written conversation with renowned education historian Bruce Kimball.³⁶

I am afraid that I have the somewhat out-of-fashion recommendation to put the theory aside and proceed ruthlessly inductively. I mean to gather and examine your evidence rigorously and thoroughly--whatever that might be – and then induce from the evidence your own interpretation. Build your own theory from the evidence, so to speak. The best authority I have for this, I suppose, is the British philosopher William Whewell in his study of induction. For Whewell, an induced thesis explaining evidence is an unaccountable stroke of insight, and that thesis then becomes the hypothesis that one tests against new evidence, and this process continues as one proceeds in the research examining new evidence. Conversely, the problem with taking Foucault or neoclassical economists or anyone as a theoretical framework (which is commonly recommended in studies of higher education in the United States) is that one inevitably starts fitting the evidence to one's framework or lens.³⁷

To call Whewell a philosopher is somewhat reductive – he was one of these Victorian gentlemen polymaths who might have called himself in turn a scientist, a mathematician, a physicist, a philosopher and a historian. His most prominent work consists in a multiple-volume history and philosophy of the 'inductive sciences', written between 1837 and 1840, but he subsequently composed a more methodological treatise on induction, in opposition to the empiricism of John Stuart Mill.³⁸

³⁵ Michel Foucault, *L'archéologie du savoir* [The Archaeology of Knowledge] (Paris, France: NRF Gallimard, 1969).

³⁶ Kimball is the author, among other publications, of: Bruce A. Kimball, *Orators & Philosophers: A History of the Idea of Liberal Education* (New York: Teachers College Press, 1986), Bruce A. Kimball, *The liberal arts tradition: A documentary history* (University Press of America, 2010), as well as several publications on the Harvard Case Method which will be used later in this treatise.

³⁷ Bruce Kimball, *in correspondence with the author*, August 1, 2014.

³⁸ Whewell wrote several editions. For the purposes of this research, I used:

William Whewell, *History of inductive sciences*, 3rd ed (New York: D. Appleton and Company, 1858). Available as a public domain e-book. Accessed April 28, 2015:

<https://books.google.nl/books?id=9x9ubxKt8m0C&ots=VQ2EBIs4B7&lr&pg=PA3#v=onepage&q&f=false>

William Whewell, *The philosophy of the inductive sciences* (Cambridge, UK: Cambridge University Press, 2014). Original work published 1840.

William Whewell, *Of Induction: With Especial Reference to Mr. J. Stuart Mill's System of Logic* (London, UK: John W. Parker, West Strand, 1849) Available as a public domain e-book. Accessed April 28, 2015:

<https://ia600401.us.archive.org/30/items/inductionwithes00whewgoog/inductionwithes00whewgoog.pdf>

Although the epistemology of Whewell's work is very far from that of Foucault's post-structuralism, the preface to *History of the Inductive Sciences* did away with strict nineteenth century empiricism. Whewell acknowledged the process within 'schools of philosophy' by which facts eventually become 'generalizations',³⁹ in what Strong termed 'an alliance with the Kantian point of view' in reference to Kant's anthropocentric turn.⁴⁰ In essence, for Whewell, separate 'facts' cannot be theoretically understood until someone proposes a hypothesis to connect the dots. Finding the right hypothesis is a matter of research and knowledge, but also of inexplicable creative insight, according to Whewell. Strong cites a good example of this process in practice, using the field of astronomy as an illustration:

I conceive that Kepler, in discovering the law of Mars' motion, and in asserting that the planet moved in an ellipse, did this: - he bound together particular observations of the separate places of Mars by the notion, or, as I have called it, the conception, of an ellipse, which was supplied by his own mind. Other persons, and he too, before he made this discovery, had present to their minds the facts of such separate successive positions of the planet; but could not bind them together rightly, because they did not apply to them this conception of an ellipse. To supply this conception, required a special preparation, and a special activity in the mind of the discoverer. He, and others before him, tried other ways of connecting the special facts, none of which fully succeeded. To discover such a connexion (sic), the mind must be conversant with certain relations of space, and with certain kinds of figures. To discover the right figure was a matter requiring research, invention, resource. To hit upon the right conception is a difficult step; and when this step is once made, the facts assume a different aspect from what they had before: that done, they are seen in a new point of view; and the catching this point of view, is a special mental operation, requiring special endowments and habits of thought. . . Kepler, then, I say, bound together the facts by super-inducing upon them the conception of an ellipse; and this was an essential element in his Induction.⁴¹

It is worth noting that Whewell's methodological focus was on the history of the sciences, but I submit that his methods are equally valid for the history of educational ideas. For instance, upon reading the founding documents of McMaster University, one would frequently run into the term 'self-directed learning', which could be recognized from the work of Carl Rogers and colleagues, but trying to find a direct connection between McMaster and Rogers in the 1950s yields only indirect results. However, starting with the Rogers hypothesis, I pursued the origins of the use of the term in PBL, first via its most obvious source, an eponymous manuscript written in 1975 by Knowles, which had been mentioned by several interviewees – and from there retraced the development of this idea back to Rogers (see chapters 2 and 6). Sometimes, as in the case of John Dewey, no explicit connection was to be found, but the super-induction of Dewey's ideas binds together the evidence triangulated from the archive materials, the oral history and the contemporary publications in a manner most sensible. Popperians may sneer at the notion of an inductive method of historical analysis, but since constructivists sneer at Popperians, by that token, we run into an epistemological regress plunging us, inevitably, into post-structuralism (which I wish to eschew). Thus, Whewell's methods seemed most adapted to the subject matter and the data, and I leave deconstruction to future historians.

³⁹ Whewell, *History of inductive sciences*, 50. 'The object is not to interpret nature, but man's mind. The opinions of the Masters are the facts which the Disciples endeavour to reduce to unity, or to follow into consequences.'

⁴⁰ E.W. Strong. 'William Whewell and John Stuart Mill: their controversy about scientific knowledge'. *Journal of the History of Ideas* 16 (1955): 209–231.

⁴¹ Strong, 'William Whewell and John Stuart Mill', 216.

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Processing the data

The scope of this project demanded the processing of large quantities of historical data, in English, Dutch, and Danish as we have seen. To make sense of this data, I used a basic sorting method common to most qualitative research – that is, the use of clusters of themes. Having made use of Interpretive Phenomenological Analysis⁴² in previous unrelated research on PBL, I mapped the basic data processing template from said research on Excel, and adapted it to sort through the large swathes of archival data. Each archive document was then sorted according to the following criteria: (1) Author; (2) Date; (3) Title (collection, document number etc.) (4) Summary; (5) Relevant quotes (literal or translated) or summaries; (6) Themes or key words; (7) Personal comments and interpretations. Three Excel databases were produced – one for McMaster, one for Maastricht and one for the Danish Universities. These were further sub-divided into categories by provenance of documents, and by date. Themes and authors were then colour-coded to make them easier to find. Each section had its own set of themes, which informed which historical questions would be the most interesting to answer.

McMaster	Maastricht	Denmark
Assessment	Assessment	Assessment
Community-orientation	Community-orientation	Community-orientation
Education Committee developments	Founding Fathers	Exemplarity
Evaluation	Evaluation	Founding Fathers
Exemplary Universities / Practical influences	Education Research	Group Work
Historical Events	Historical Events	Historical Events
Founding Fathers	Intellectual influences	Interdisciplinarity
Integration of disciplines	Founding Fathers	Marxism
Knowledge v. Skills	Knowledge v. Skills	Philosophical rationale
McMaster Basic Philosophy	McMaster University's influence	Political Conflicts
McMaster Beginnings	Objectives of the education programme	Problem-orientation
Philosophical / Intellectual influences	Problems	Psychological Rationale
Problems	Role of the Teacher	Role of the Teacher
Problem-solving skills	Skills Lab	Students Roles and Attitudes
Role of the Teacher	Student Attitudes	Study format / Curriculum design
Student Attitudes / Motivation	Study format / Curriculum design	Study spaces / Learning resources
Study format / Curriculum design	Study spaces / Learning resources	
Study spaces / Learning resources		

Table 1: Themes used in analysing the historical data

⁴² Virginie Servant and Eleanor Dewar, 'Investigating Problem-Based Learning Tutorship in Medical and Engineering Programs in Malaysia', *Interdisciplinary Journal of Problem-Based Learning* 9, no.2 (2015), <http://dx.doi.org/10.7771/1541-5015.1442>.

The transcripts of the interviews were parsed several times, annotations and comments made in the margin, and the data sorted according to the same themes as the archive materials. In addition, contemporary publications were summarised, with key quotes noted down verbatim, and comments added in the margin. A spread sheet kept track of the themes covered in each publication, and for the largest ones, a further theme-by-theme summary was written, along with colour-coded text-highlights in the annotations. However, even so systematically sorted, making sense of such a large quantity of data required further analytical tools.

For this, I turned to Whewell once again - in addition to providing a sound theoretical underpinning, he also proposed useful methodological contraptions as a physical aid to the aspiring historian. Of particular usefulness was Whewell's use of 'inductive charts', which are graphic representations of the historical evolution of various scientific 'streams':

Inductive charts: Since the advance of science consists in collecting by induction true general laws from particular facts, and in combining several such laws into one higher generalization in which they still retain their truth; we might form a Chart, or Table, of the progress of each science, by setting down the particular facts which have thus been combined, so as to form general truths, and by marking the further union of these general truths into others more comprehensive. The Table of the progress of any science would thus resemble the Map of a River, in which the waters from separate sources unite and make rivulets, which again meet with rivulets from others fountains, and thus go on forming by their junction trunks of a higher and higher order. [...] By forming, therefore, such Inductive Tables of the principal sciences of which I have here to speak and by regulating by these tables, my views of the history of the sciences, I conceive that I have secured the distribution of my history from material error.⁴³

In preparing the intellectual history of PBL, I have endeavoured to make use of the above-mentioned charts to construct a logical history of the streams of thought, both philosophical and educational, which have led to the foundation of PBL.⁴⁴ As Whewell only described them and never actually published them, these charts form my interpretation of the method, suited to the purpose of my research.

Thus, constructing arguments for the purpose of this treatise was done as follows: a general reading of the available historical materials nourished the formation of an initial hypothesis, connecting a specific historical event (such as the invention of the 'progress test') or a specific idea (such as the 'tutor') to an intellectual origin (such as 'Abraham Flexner' or 'Oxford University'). I would then parse through the databases for the archive materials, oral history transcripts and the annotations for the contemporary publications in search of triangulated evidence for this hypothesis.⁴⁵ I then proceeded with the following test of strength:

⁴³ Whewell, *History of inductive sciences*, 47.

⁴⁴ See next page for example of a chart.

⁴⁵ What is meant here by triangulation is: 'Triangulation of data combines data drawn from different sources and at different times, in different places or from different people' (Srmo.sagepub.com, *Triangulation: SAGE Research Methods*). Last accessed April 28, 2015:
<http://srmo.sagepub.com/view/the-sage-dictionary-of-social-research-methods/n211.xml>

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Evidence	Hypothesis
1 source	Not strong enough, hypothesis needs to be changed
2 independent sources of same type⁴⁶	Not strong enough, hypothesis needs to be changed, unless extremely compelling logical argument in favour of hypothesis.
2 independent sources of different types	Hypothesis can tentatively be pursued if a/ argument is sound by means of <i>deduction</i> b/ no contradictory evidence exists or has been found.
3 independent sources	Hypothesis is tentatively accepted and argument can be built upon it.

Table 2: Test of Strength for Historical Evidence

Arguments were then grouped together in inductive charts in order to weave a coherent historical narrative. Below is an example of a chart, used in this case to match the timing of intellectual and institutional influences and order these causally.

To understand the chart below, the reader should begin by looking at the timeline on in the centre, which indicates past to present in blocks of 25 years, top to bottom. The names of the universities and thinkers are placed by a marker that indicates the period in which they were most influential or in which some significant related event occurred. For example, Case Western Reserve is placed at the beginning of the 1950s because their systems-based programme started in 1952, building up in the late 1940s. There are two sorts of arrows on this chart: red ones, signifying that one institution may have influenced another, and green ones, signifying that a thinker may have influenced an institution, or another thinker. A solid line indicates a direct influence, a dotted line an indirect influence. Thus we can see on this chart that Harvard Law, beginning in the 1870s, influenced McMaster via two routes: one through the Harvard Medical School and Case Western Reserve University in the 1900s and 1950s, and another through Harvard Business School in the 1920s.

⁴⁶ Independent sources signify sources that claim the same things but are not likely to have influenced each other in making said claims. The likelihood of independence is left up to the interpretation of the historian.

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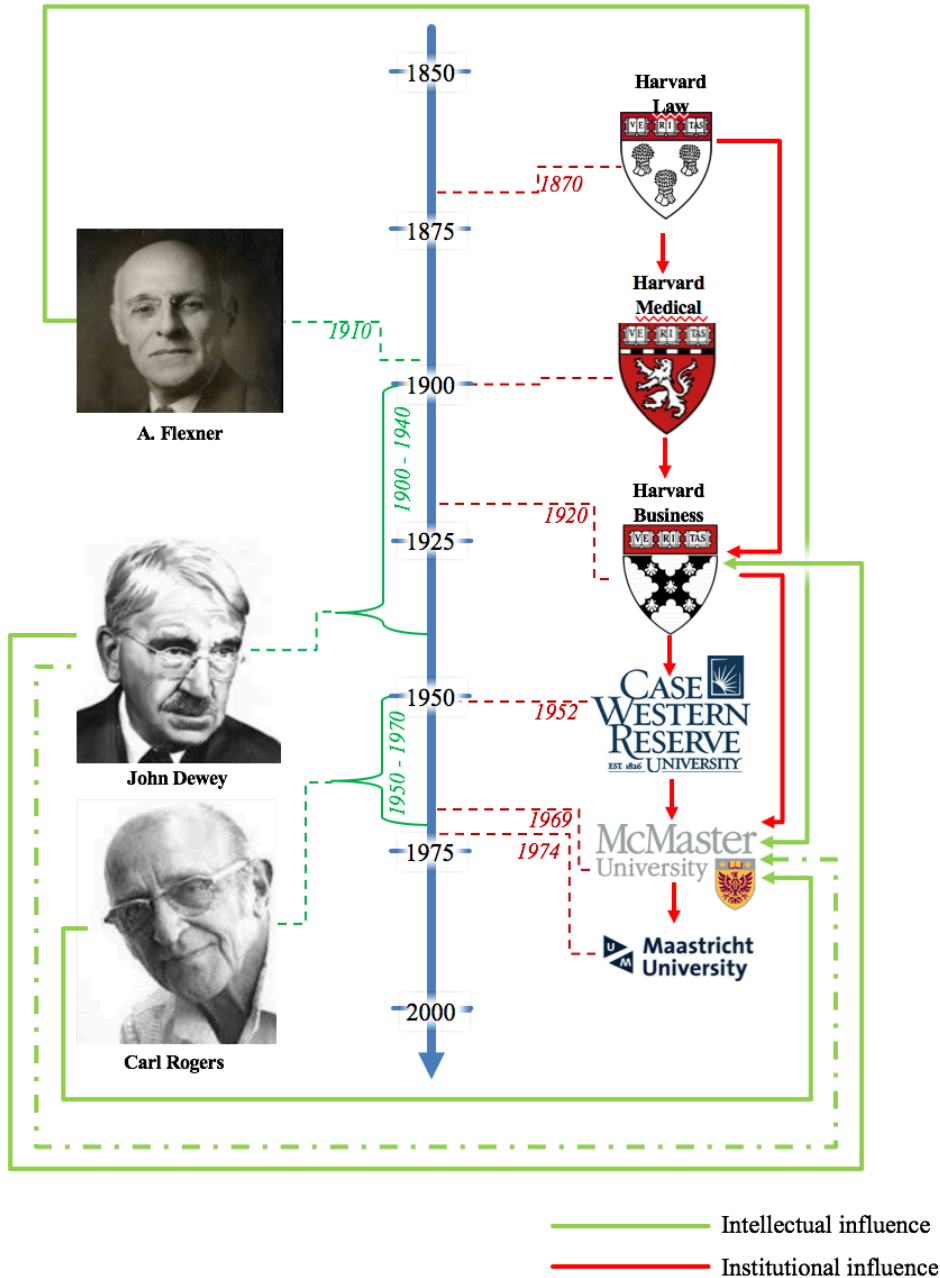


Figure 1: Inductive Chart McMaster School of Medicine Influences

As a final note on method, this treatise uses the Chicago Style 16th edition footnotes referencing system. This provides the freedom to elaborate on matters not immediately relevant to the narrative but of historical or methodological interest, as well as providing extensive referencing opportunities, especially regarding primary sources.

Post-script on historical bias

Since the advent of the Scientific Method, positivist scholars from all disciplines have sought to banish personal bias from their research. This claim to objectivity has been obliterated by all manner of post-positivist schools of thought and it is today quasi-impossible not take bias into account when producing research, especially with qualitative data. Since, according to this

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world-view, bias cannot be eliminated, it means that the author should acknowledge potential sources of bias beforehand and take appropriate measures to counter-weigh their influence, by pinpointing areas where this bias may be most prominently expressed.

This chapter on methodology would therefore be incomplete without some mention of the fact that Henk Schmidt, the principal supervisor of the research, is also one of the main protagonists of the story, and therefore has a very personal stake in the outcome of the research. It must be taken into account that his personal recollection of events would have guided his supervision of the research. Some might therefore argue that such an important historical protagonist has no place supervising a historical thesis of which he is the subject. However, it is my experience after four years of work on this project that the supervision simply could not have been done by an outsider to the history of PBL: the risk of missing data or misinterpretations would have been too large. An outsider would not have known where to point when I was lost in the data. To compensate for potential historical bias, firstly, a second supervisor, Maarten Frens advised the research with a particular eye to moderating historical biases. Secondly, I used Schmidt's contributions like any other historical source and gave it the same considerations and burden of proof as the other interviews. If written evidence contradicted his spoken statements, written evidence was always preferred, and further evidence was sought out from other eye-witnesses (this involved an extensive amount of e-mailing!). When there was any doubt that Schmidt's version of events might have clouded the history, I would also send my draft manuscript to a third party, such as Geoff Norman or Pie Bartholomeus, to check if they agreed with the story.

References

- Adolphsen, Jes. *I Satte os I Jeres Baner. Interviews med 19 vigtige personer I AUC historie* [You put us in your tracks: Interviews with 19 important persons in AUC history]. Aalborg: Aalborg Universitetsforlag, 1984.
- Barton, Keith C. 'Primary sources in history: Breaking through the myths'. *Phi Delta Kappan* 86, no. 10 (2005): 745–753.
- Beck, Henning and Mette Müller. *The Room of Maneuver (sic) of an Institution: the case of the university*. Final Thesis, International Development Studies. Roskilde, Denmark: Roskilde University Centre, 1992.
- Brundage, Antony. *Going to the sources*, 1st ed. Wheeling, IL: Harlan Davidson, 2008.
- Chng, Esther, Elaine H.J. Yew, and Henk G. Schmidt. 'Effects of Tutor-Related Behaviours on the Process of Problem-Based Learning'. *Advances in Health Sciences Education* 16, no. 4 (2011): 491–503.
- Clausen, Allan. *Kampen for et nordjysk universitet* [The Battle for a North Jutland University]. Aalborg: Aalborg Universitetsforlag, 1984.
- De Graaff, Erik, and Anette Kolmos. 'Characteristics of Problem-Based Learning'. *International Journal of Engineering Education* 19, no. 5 (2003): 657–62.
- Featherstone, Mike. 'Archive'. *Theory, Culture & Society* 23, no. 2-3 (2006): 591–596.
- Fontana, Andrea and James Frey, 'The Interview: From Neutral Stance to Political Involvement'. In *The Sage Handbook of Qualitative Research*, 3rd ed. Edited by Norman K Denzin & Yvonna S Lincoln, 695-728. Thousand Oaks, CA: Sage Publications Inc., 2005.
- Foucault, Michel. *L'archéologie du savoir* [The Archaeology of Knowledge]. Paris: NRF Gallimard, 1969.
- Hansen, Else. *En koral i tidens strøm* [A coral in the flow of time]. Frederiksberg, Denmark: Roskilde Universitetsforlag, 1997.
- Howell, Martha, and Walter Prevenier. *From reliable sources*, 1st ed. Ithaca, NY: Cornell University Press, 2001.
- Knegtmans, Peter J. *De Medische Faculteit Maastricht: een nieuwe universiteit in een herstructureringsgebied, 1969-1984* [The Medical Faculty Maastricht: a new university in an era of restructuring]. Assen, Netherlands: Van Gorcum, 1992.

REVOLUTIONS & RE-ITERATIONS

- Kowal, Sabine and Daniel C. O'Connell. 'The Transcription of Conversations'. In *A companion to qualitative research*, 1st ed. Edited by Uwe Flick, Ernst von Kardorff, and Ines Steinke, 248-251. London: Sage Publications, 2004.
- Kwan, Chiu-Yin and Leslie Tam, 'Hybrid PBL-What is in a Name?' *Journal of Medical Education* 13, no 3 (2009): 76–82.
- Longhurst, Robyn. 'Semi-Structured Interviews and Focus Groups'. In, *Key methods in geography*, 1st ed. Edited by Nicholas Clifford and Gill Valentine, 103-113. London, UK: Sage, 2003.
- Mueller, C. Barber. 'McMaster University Medical School: The Little School that Could – and Did'. *McMaster University Medical Journal* 5, no. 1 (2008): 29-33.
- Palmer, Joy and David E. Cooper. *Fifty major thinkers on education: from Confucius to Dewey*. London, UK: Routledge, 2001.
- Portelli, Alessandro. 'What Makes Oral History Different'. In *Oral history, oral culture, and Italian Americans*, 1st ed. Edited by L. Del Giudice, 21-30. New York: Palgrave Macmillan, 2009.
- Savin-Baden, Maggi and Clare Howell Major. *Foundations of Problem based Learning*. Maidenhead, UK: Open University Press, 2004.
- Schmidt, Henk G. 'Problem-Based Learning: Rationale and Description'. *Medical Education* 17 (1983): 11–16.
- Schmidt, Henk G. 'Foundations of Problem-Based Learning: Some Explanatory Notes'. *Medical Education* 27, no. 5 (1993): 422–32.
- Schmidt, Henk G., Henk T. van der Molen, Wilco W.R. te Winkel, and Wynand H.F.W. Wijnen, 'Constructivist, Problem-Based Learning Does Work: A Meta-Analysis of Curricular Comparisons Involving a Single Medical School'. *Educational Psychologist* 44, no. 4 (2009): 227–249.
- Schmidt, Henk G. 'A brief history of problem-based learning'. In *One-day, one-problem, an approach to problem-based learning*. Edited by Glen O'Grady, Elaine H.J. Yew, Karen P.L. Goh, and Henk G. Schmidt, 21-40. Singapore: Springer, 2012.
- Spaulding, William B. *Revitalizing Medical Education, McMaster Medical School the Early Years 1965-1974*. Hamilton, ON: B.C. Decker Inc, 1991.
- Servant, Virginie and Eleanor Dewar. 'Investigating Problem-Based Learning Tutorship in Medical and Engineering Programs in Malaysia'. *Interdisciplinary Journal of Problem-Based Learning* 9, no. 2 (2015), <http://dx.doi.org/10.7771/1541-5015.1442>.
- Strong, W.E. 'William Whewell and John Stuart Mill: their controversy about scientific knowledge'. *Journal of the History of Ideas* 16 (1955): 209–231.
- Thompson, Paul. *The voice of the past*, Kindle Ed. Oxford: Oxford University Press, 2000.
- 'Triangulation: SAGE Research Methods'. srmo.sagepub.com. Last accessed April 28, 2015. <http://srmo.sagepub.com/view/the-sage-dictionary-of-social-research-methods/n211.xml>
- Whewell, William. *Of Induction: With Especial Reference to Mr. J. Stuart Mill's System of Logic*. London, UK: John W. Parker, West Strand, 1849.
- Whewell, William. *History of inductive sciences*, 3rd Edition. New York: D. Appleton and Company, 1858.
- Whewell, William. *The philosophy of the inductive sciences*. Cambridge, UK: Cambridge University Press, 2014.

PART 1

Of Woodstock and Disgruntled Medics

*Foundations of McMaster School of Medicine's
Problem-based Learning Programme, 1963 – 1985.*

In the fall of 1969, McMaster University School of Medicine opened the doors of a programme unlike any other in medical education at the time. For the first twenty students that walked through ‘Mac’s’ doors in September 1969 began an educational experience that would send ripples through higher education far beyond the confines of the medical world. That experience eventually became known as ‘problem-based learning’ (PBL) and has since spread to more than 500 higher education institutions and even some K-12 schools. As explained in detail in the introduction of this thesis, problem-based learning is a form of education in which the learning begins with a realistic problem tackled by a small group of students in a class guided by a tutor who does not lecture but helps the students structure their learning. Problem based learning requires a great amount of time for self-study, and the number of lectures is therefore necessarily limited.

This first part, constituted of two chapters, was developed with a dual intention: firstly, it intended to show that the inception of what became known as PBL was not the product of a neatly pre-ordained philosophy that was handed down to McMaster’s faculty like the sacred tablets on Mount Sinai, but instead represented the coming together of people and personalities who, together, created the (very) small-scale revolution of McMaster. It may seem strange to the reader to find, upon perusing the table of content, that I intend to dedicate such a large number of pages to the description and contextualization of McMaster’s Founding Fathers and their colleagues. For the more philosophically inclined, it may be more interesting to skim over this section and recommence reading in the second half of the first chapter. However, the reason that I intend to develop such a context around the chief characters involved in this micro-revolution is precisely because of its scale. Only 19 students walked out of Mac with their *Medicinae Doctor* (MD) in 1972 – and thus, I would argue that personalities that might have been drowned out in a large, bureaucratic institution were instead allowed to shape the programme in their own image at such a small, experimental scale. And so, to understand the programme, one must begin by understanding the people that shaped it. It is ironic that so many ‘principles’ of PBL are today taken as *ex vi termini*, and the rules and requirements that an educational programme must abide by to deserve the appellation ‘PBL’ are debated like articles of faith, without realizing that many of these ‘rules’ are most probably enlargements of micro-events from McMaster’s early history, the origins of which were lost... until now. My second intention for the first two chapters is to show that whilst McMaster represented a form of insurgency against established medical education practices, the ideas that sprung therefrom were not entirely idiosyncratic. In fact, McMaster’s founding ‘philosophy’, if the term may be applied to such an eclectic collection of thoughts and ideas, represents the re-iteration of a number of existing lines of thought in philosophy of education, medical education and psychology. It also reflects the changing educational landscape in medicine since the start of the 20th century. And thus, the two following chapters will lead us to the argument that between revolution and re-iteration, there lay a rich historical context, marked, among other things, by the festival of Woodstock and the emergence of a generation of disgruntled medics, that provided the right conditions for Problem-based learning to emerge and survive as an educational method.

The purpose of this chapter is to set the scene for the small-scale educational revolution that occurred between 1963 and 1985 at McMaster University School of Medicine, which welcomed its first batch of students to its temporary campus in Hamilton, Ontario, in September 1969. We begin by introducing the five ‘Founding Fathers’ of McMaster – Drs. John Evans, Fraser Mustard, Bill Spaulding, Jim Anderson and Bill Walsh – whose role and influence arguably left the greatest mark on the shape of the programme. The picture further develops with the clarification of certain ‘commencement myths’, in particular the role of the ideas of Dr. Howard Barrows in the events unfolding at McMaster. We will then put the final touches to our opening scene with a presentation of the Education Committee (EC), which was the arena for most of the educational debate in the years leading up to (and just after) the start of the programme. Finally, we will delve into the specifics of the programme in an attempt to understand just what made it so unusual by comparison with other medical institutions of the late 1960s.

The Founding Fathers

In 1963, Dr. Henry ‘Harry’ Thode, nuclear physicist by profession and President of McMaster University from 1961 to 1972,⁴⁷ penned the earliest written record of the philosophy of the university’s soon to be new School of Medicine.⁴⁸ Aside from the drafting of this document, Thode’s involvement in the education programme at McMaster University’s Medical School chiefly resides in his choice of Founding Dean. Indeed, the Hamilton and Toronto surroundings could offer a plethora of suitably distinguished medical professionals and academics as potential candidates for the job, but Thode’s stroke of genius was to elect the very young and charismatic Dr. John Evans to the position. Indeed, although Thode was no longer involved in any direct sense with the Medical School after 1965, through his choice of Evans, he was able to offer his new School a team of some of the most talented, bright, enthusiastic and open-minded people the medical world had to offer at the time. For indeed, Evans was not alone – and although the Deanship bore his name until 1972, the beating heart of the programme lay in the collective hands of his most trusted associates: Drs. Fraser Mustard, Bill Spaulding, Jim Anderson and Bill Walsh. Together, they forged a curriculum that turned all other medical curricula on their heads. After the inception years in which the philosophical foundations of the school were laid down (1965-1966), a cast of 13 characters of McMaster’s history came together to complement the original team of five. These thirteen are listed by McMaster’s first chair of surgery, Barber Mueller,⁴⁹ as: J.R. Evans – Dean; J.F. Mustard – Pathology; J.

⁴⁷ ‘Community of Distinction’, Faculty of Health Sciences McMaster University, accessed December 12 2013, http://fhs.mcmaster.ca/main/community_of_distinction.html

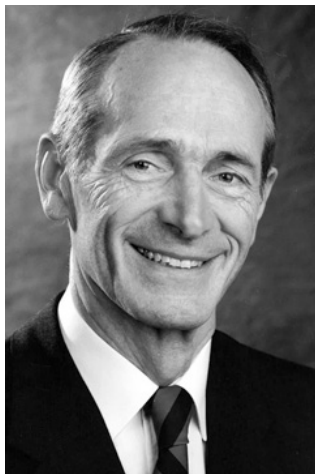
⁴⁸ Henry Thode, Report and Recommendations Regarding a Medical School at McMaster University’. Report from 1963. Accreditation Preparation Visit - HHS/FHS Archives, Box 144.2;1. McMaster University, Hamilton, Ontario. The content of this document will be discussed at a later point.

⁴⁹ C Barber Mueller, ‘McMaster University Medical School: The Little School that Could – and Did’. *McMaster University Medical Journal* 5, no. 1(2008): 29-33.

Anderson – Anatomy; W.J. Walsh – Medicine; W.B. Spaulding – Medicine; E.J.M. Campbell – Medicine; C.B. Mueller – Surgery; P. Cockshott – Radiology; F.L. Johnson – Ob. Gyn.; A. Zipursky – Paediatrics; N. Epstein – Psychiatry; D.L. Sackett – Epidemiology & Biostatistics; R. Hall – Biochemistry.

It is interesting to note that some of these names are complete unknowns to all but a handful of medical educators whereas some of the names that have become household favourites of problem-based learning literature over the years do not figure on the list at all. Too little credit has been given to the five pioneers who chiselled out the education programme that would become ‘problem-based learning’ and spread through medical education one continent after another. Therefore, it seems appropriate to begin this treatise on the philosophical re-iterations and intellectual revolutions that brought about problem-based learning with a portrait of the men to whom it owes so much.

Dr. John Robert Evans
*Founding Dean*⁵⁰



At the tender age (by academic standards) of 35, Dr. John Evans, a junior associate in the Department of Medicine at the University of Toronto and Rhodes Scholar at the University of Oxford, became the runner up for the position of Founding Dean of McMaster’s new School of Medicine.⁵¹ To those that knew John Evans, it came as little surprise that Thode placed his trust in this unlikely candidate above more senior and reputed rivals for the position. Indeed, John Evans could boast qualities that tempered the disadvantages of youth and inexperience.

Firstly, he came from what was locally known as a F.O.O.F – a Fine Old Ontario Family.⁵² While this may conjure images of sober dining halls with grandfather clocks and aged scotch, it meant that pre-existing political connections and an affinity for the public life were part and parcel of the Founding Dean’s portfolio when he stepped into the role.

Secondly, John Evans was a man of undeniable charisma – a fact corroborated by almost every interviewee who spoke on the subject, as phrased by Dave Sackett, who worked with John Evans between 1967 and the latter’s departure from McMaster in 1972:

⁵⁰ Image source: Faculty of Health Sciences, McMaster University. Accessed: November 27, 2013. fhs.mcmaster.ca

⁵¹ William B. Spaulding, *Revitalizing Medical Education, McMaster Medical School the Early Years 1965-1974* (Hamilton, ON: B.C. Decker Inc. 1991), 24; Unknown ‘McMaster University gives birth to a medical school,’ *McMaster Faculty of Health Sciences Newsmagazine* 6 no. 2 (2012), accessed November 27, 2013, http://fhs.mcmaster.ca/networkfall2012/medical_school.html

⁵² David Sackett, (*Founding Chair of Epidemiology at McMaster*) in interview with the author, by telephone, October 25, 2012.

CHAPTER 1: THE FOUNDING OF MCMASTER UNIVERSITY SCHOOL OF MEDICINE

We all encountered and joined a charismatic leader, John Evans, who was for all of us, probably the most impressive person we'd ever met.⁵³

In addition, John Evans possessed exceptional leadership qualities that those who worked with him still recall with crystal clear precision:

He had this aura of academic... professionalism. When you talked to him, he gave you his full attention. He sat an hour looking you in the eye. He greeted you to the door. While you talk to others, there is a phone call or somebody is coming and you get interrupted. John Evans, when he gives you an hour, gives you an hour. So that, from that, no question, I think he was the most scholarly and most gentlemanly and most diplomatic of the lot.⁵⁴

John Evans was educated in the most traditional medical setting imaginable at the University of Toronto, where he met and befriended Fraser Mustard, whom he captained in the football team for Toronto Varsity.⁵⁵ Stories vary regarding the exact relationship that existed between John Evans and the other Founding Fathers prior to 1965, but it is clear that they all knew and trusted each other on a professional and personal level prior to the formation of the Education Committee at the new School of Medicine in 1966.⁵⁶ It could be argued that the bonds of friendship which united John Evans with his Founding Educational Committee were his greatest and most enduring asset in the setting up of the Medical School.⁵⁷ In entrusting the day to day running of the programme planning process to Bill Spaulding, John Evans not only provided McMaster with the nuts-and-bolts organizational support it needed,⁵⁸ but also gave himself the freedom to take a bird's eye view of the programme and deal with matters of political and international importance instead. Indeed, after the first few months, he was hardly ever seen at Education Committee meetings,⁵⁹ although he did regularly attend and influence informal gatherings with the Faculty members. George Sweeney, who was present at these meetings, recalls:

Now, at that time, we used to have, once a week, a no-agenda debate in the Faculty Club, when the Faculty was still small enough that you could do that. Now, John Evans, from my memory, was nearly always present at those and was very, very influential in speaking to whatever was being debated.⁶⁰

The assets highlighted above, both personal and relational, gave John Evans the backwind he needed to develop his educational philosophy. Indeed, whilst he did not actively take part in the day-to-day development of the programme, he was credited with authorship of the founding text of the School, upon which its entire philosophy was built,⁶¹ dated March 1966.⁶² This paper

⁵³ Sackett, in interview with the author, October 25, 2012.

⁵⁴ Mohammed Ali, (*McMaster Unit Planner for Haematology in 1970*) in interview with the author, at McMaster University, October 30, 2012

⁵⁵ James Kraemer, (*McMaster Education Coordinator in 1968*) in interview with the author, by telephone, November 20, 2012

⁵⁶ Spaulding, *Revitalizing Medical Education*, 27.

⁵⁷ This argument was in fact made by Barber Mueller, (*Founding Chair of Surgery of McMaster*) in interview with the author, at Hamilton, Ontario, October 25, 2012.

⁵⁸ The prime organizational role of William Spaulding is supported by his former colleague Mueller in interview with the author, October 25, 2012.

⁵⁹ None of the minutes of the Education Committee for the period 1966-1970 indicate the presence of Dr. Evans.

⁶⁰ George Sweeney, (*McMaster Summer Programme supervisor 1968, Education Committee Member*) in interview with the author, by telephone, October 25, 2012

⁶¹ Spaulding, *Revitalizing Medical Education*, 29.

⁶² John Evans, 'General Objectives'. Memorandum from March 1966. Objectives of the Faculty School of Medicine - HHS/FHS Archives, Box 145.8;1. McMaster University, Hamilton, Ontario. It is interesting to note

became known as the ‘Objectives of the Faculty School of Medicine’ and spurred much of the thinking around the programme in subsequent years.

Little is known of the intellectual influences that might have prompted John Evans to reflect upon medical education the way he did. Although he was not insensitive to the changing times and could hardly have been called conservative, he was by no means a child of the sixties.⁶³ Although some labelled him a ‘philosopher’⁶⁴ and a ‘very thoughtful man’,⁶⁵ it is unlikely that he would have indulged in the sorts of radical rethinking of science that was going on in the Old Continent.⁶⁶ Indeed, all indications are that John Evans, like his colleagues in the Education Committee, was a firm pragmatist in his thinking. In a series of oral history interviews run by Joan McAuley between 1978 and 1979, John Evans confessed to being inspired by the work of Flexner and Addison:

I think that the educational programme put into practice what people since Addison had been talking about, more than a century before, as the desirable goal - the things that Flexner was really talking about, I think and his ideas, but that didn't get translated that way.⁶⁷

Whilst Abraham Flexner seems to have been a bedside classic for many of the early-day participants in the McMaster experiment, the reference to Addison is somewhat more enigmatic.⁶⁸ John Evans was likely referring to Dr. Thomas Addison, the famous British 19th Century physician whose most acclaimed publication, *On the Constitutional and Local Effects of Disease of the Suprarenal Capsules*, paved the way for the discovery and treatment of what is now known as ‘Addison’s disease’ (an ailment of the suprarenal glands).⁶⁹ But whilst Addison wrote eloquently on the subject of pathology, he had little to say about medical education *per se*. Stated in the words of Geoffrey Norman: ‘he would have been one of those medical sages, as opposed to a philosophical sage’,⁷⁰ valued for his medical insights rather than any philosophical musings on education. However, Addison’s monograph is filled with diagrams and medical case histories, which strangely resemble some of the items utilized in McMaster’s early problem-scenarios and learning resources.

that the original text as found in the archive does not state an author or a date. Since it was found filed with material from 1966, and, from the descriptions in Spaulding’s account, matches the content of the paper attributed to Evans, we can reasonably assume that this is indeed the Founding Paper in question (and will continue to assume so throughout this treatise). The fact that neither author nor date are mentioned does raise interesting questions as to its intended purpose at the time of writing.

⁶³ Sweeney, in interview with the author, October 25, 2012.

⁶⁴ Ralph Bloch, (*student of the first cohort of McMaster*) in interview with the author, at Hamilton, Ontario, October 23, 012

⁶⁵ Sweeney, in interview with the author, October 25, 2012

⁶⁶ In reference to the Frankfurt School, whose critical ideas on science were highly influential in the Danish inception of problem-oriented learning, as will be shown in later chapters.

⁶⁷ Joan McAuley, ‘McMaster Oral History - Dr. J.R. Evans - 28th September 1979’. Interview transcript from 1979. Founding Fathers Interviews - HHS/FHS Archives, McMaster University, Hamilton, Ontario.

⁶⁸ The subject of Flexner will be covered in depth later on. Suffice to say for now that there is both interview evidence and archival evidence that his work was perceived to be influential.

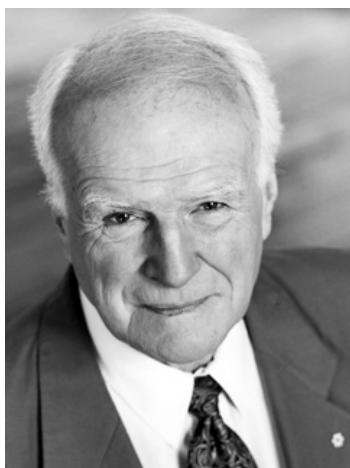
⁶⁹ Thomas Addison, *On the constitutional and local effects of disease of the supra-renal capsules*, special edition (US-AL: Gryphon Editions Ltd., 1980).

⁷⁰ Statement made during an interview with Barber Mueller at which Geoffrey Norman was present (Mueller, in interview with the author, October 25, 2012)

John Evans left McMaster only seven years after his nomination to the deanship, handing the top position over to his trusted friend Fraser Mustard. It may seem strange that the man who started arguably the biggest revolution in medical education of the last century was willing to leave his creation behind.⁷¹ Kinsey Smith, a man of strong influence on the McMaster curriculum during the Evans years, had some ideas as to what might have prompted John Evans to leave:

Well he left for the same reason he came. He was a young man on the rise. And he actually left and stood for parliament, believe it or not. He became president of the Torstar Corporation, which is the newspaper outfit. I mean, he was a mover and shaker and he... his idea was to set something in motion and then to leave it to other people to keep it on the rails.⁷²

After an impressive career that included, among other accomplishments, the presidency of the University of Toronto and the directorship of the Population, Health and Nutrition Department of the World Bank, John Evans retired in the Toronto area.



Dr. James Fraser Mustard
Founding Chairman of the Pathology Department
*Founding Member of the Education Committee*⁷³

Dr. Fraser Mustard was 39 years of age and already a world-famous blood platelets researcher when he was invited by his long-term friend and former football captain John Evans to join the Education Committee and to found the Department of Pathology of McMaster's new Medical School.⁷⁴

Fraser Mustard could aptly be described as a force of nature – having earned the telling moniker ‘The Elk’⁷⁵ at the University of Toronto’s Football Club, his red-faced, ‘flash-bang lightning’⁷⁶ drive quickly became an identifiable constant of McMaster’s planning process. Mustard was something of straight-cut,⁷⁷ formal man in his personal life, as recounted by his colleague David Sackett:

He was a rather formal individual; I guess would be the best way to put it. So that he did not have the easy sort of ways that guys like Jim Anderson and the rest of us had. And he was such a formidable researcher and talent that he, without really intending to at all, he would intimidate the hell out of folks.⁷⁸

⁷¹ This point will be further developed later on.

⁷² Kinsey Smith, (*McMaster Head of Nephrology in 1969*) in interview with the author, by telephone, July 10, 2013.

⁷³ Image source: Faculty of Health Sciences, McMaster University. Accessed November 27, 2013. fhs.mcmaster.ca

⁷⁴ Unknown, ‘Medical school founder Fraser Mustard dies’. *News Releases*. McMaster University Faculty of Health Sciences, 2011. Accessed November 28, 2013.

http://fhs.mcmaster.ca/main/news/news_2011/fraser_mustard.html

⁷⁵ Sweeney, in interview with the author, October 25, 2012

⁷⁶ Smith, in interview with the author, July 10, 2013

⁷⁷ Hamilton, in interview with the author, November 12, 2012

⁷⁸ Sackett, in interview with the author, October 25, 2012

Geoffrey Norman, who worked as a Research Assistant in the Programme for Education Development under the Deanship of Dr. Mustard, echoed this sentiment: ‘and so he [Fraser Mustard] was one of those guys who walks into the room and everybody goes silent. Very strong personality. He was also an excellent platelets researcher. – World class platelets researcher’.⁷⁹ Indeed, when it came to medical research, to say that Mustard was a focused man would be an understatement.⁸⁰ His scientific interest in blood platelets bordered on the obsessive, as recounted by his former student Ralph Bloch: ‘Fraser Mustard had very clear ideas about what we had to know about the biochemistry of platelets and the process of inflammation. Everything else didn’t matter too much’.⁸¹

Fraser Mustard was indeed a great scientist, whose research efforts eventually awarded him the title of Companion of the Order of Canada and an induction into the Canadian Hall of Fame.⁸² Whilst his scientific *palmarès* brought great prestige to the Medical School, it also generated some interesting interpersonal challenges in a problem-based learning setting. David Sackett recalls:

And, and as a rigorous, tough-minded scientist, he would be hard to beat. But he was... a driven kind of person, where if he had an area that he was particularly interested in, at that moment in time, it would impinge on every interaction with any human for a matter of days! And so if he had a bee in his bonnet of that sort, it made him a terrible tutor at times!⁸³

For indeed, any cardiovascular tutorial in which Fraser Mustard was placed in the role of tutor was likely to turn into an inspiring lecture on platelets in a matter of minutes, as his colleague George Sweeney recalls: ‘Anybody who experienced Frasers’ tutorials would A/ Find them exciting. B/ Find ... that you had to do a lot of listening. C/ That they would tend to concentrate on the platelets’.⁸⁴

Archival evidence suggests that John Evans was well aware of the character traits of his colleague – and the impact that these might have on the school. Indeed, in a hand-written note marked ‘confidential’,⁸⁵ John Evans scribbled in blue ink the name ‘Fraser Mustard’, followed by the words: ‘dangerous, distorting force - needs feedback evaluation’ and ‘autocratic + forceful. Trusts modern science. Very strong ideas, great enthusiasm’. The next section of the note is harder to decipher as the handwriting gets more erratic, and its content is quite cryptic. It appears to read:

Needs subtle nuance to understand difficulties _____ new techniques. Go to Southern California, Western Reserve, Stanford, meet some of people who have _____ to demand that med students be teachers + researchers + _____. Just NO SO.

⁷⁹ Geoffrey Norman, (*McMaster research assistant to Vic Neufeld and Howard Barrows in 1971*) in interview with the author, at McMaster University, October 20, 2012

⁸⁰ Smith, in interview with the author, July 10, 2013

⁸¹ Bloch, in interview with the author, October 23, 2012

⁸² Unknown ‘Medical school founder’.

⁸³ Sackett, in interview with the author, October 25, 2012

⁸⁴ Sweeney, in interview with the author, October 25, 2012. The story was related by two other interviewees independently: Hamilton, in interview with the author, November 20, 2012; Norman, in interview with the author, October 20, 2012.

⁸⁵ John Evans, ‘Confidential (Accreditation Visit)’. Undated handwritten notes. Accreditation Preparation Visit - HHS/FHS Archives, Box 144.2;1. McMaster University, Hamilton, Ontario. The note itself is undated but it was grouped by the archivist with a series of notes and correspondence of John Evans dating from 1967.

One possible interpretation is that Evans was trying to get Mustard to understand that he expected too much of the students in terms of content retention and academic performance, and thus hoped to convince him to soften his stance by sending him to other medical schools of educational repute. This would be consistent with Mustard's reputed intransigence on content-matter knowledge.⁸⁶ This note probably says as much about Evans' eye for detail as it does about Mustard's scientific persona. These sorts of intellectual sparks naturally fly between pioneers, and it was the outcome of precisely these sorts of differences that made McMaster a 'witches' brew' for educational innovation.⁸⁷

It came as no surprise that in 1972, John Evans left the Deanship of the Medical School in the hands of the man who had been his deputy-Dean up until then. And so it was that Fraser Mustard became the second Dean of the Faculty of Health Sciences until 1982.



Dr. William Bray Spaulding

*Founding Associate Dean
Founding Chairman of the Education Committee⁸⁸*

Aged 44 at the time of the founding of the Education Committee of McMaster University School of Medicine, Dr. William 'Bill' Spaulding was its oldest member. Prior to his move to McMaster, Spaulding held the position of Associate Professor of Medicine and Associate Dean for Student Affairs at the University of Toronto, where he met John Evans.⁸⁹ Spaulding was invited by Evans to be his Associate Dean in the autumn of 1965.⁹⁰ In that role, he formed and took leadership of McMaster's revolutionary Education Committee, which he chaired until the mid 1970s.

Spaulding was a practical and pragmatic man, whose attention to detail and obsessively organisational mind made him a perfect manager, faced with the chaotic beginnings of this revolutionary school. His character was portrayed with humour by his fellow Education Committee member Jim Anderson in 1979:

Bill Spaulding was Chairman and ruled with an iron hand. The Education Committee met on Fridays at 1 o'clock though hell should bar the way. This included Good Friday. And I'm sure if Christmas had fallen on a Friday, we would have met at 1 o'clock.⁹¹

⁸⁶ Bloch, in interview with the author, October 23, 2013.

⁸⁷ Smith, in interview with the author, July 10, 2013.

⁸⁸ Image source: Faculty of Health Sciences, McMaster University. Accessed, December 4, 2013. fhs.mcmaster.ca

⁸⁹ Roland Charles, 'Obituary / Obituaire William Bray Spaulding 1922-1993.' Accessed December 6, 2013. <http://www.cbmh.ca/index.php/cbmh/article/viewFile/1465/1431>

⁹⁰ Unknown, 'McMaster University'.

⁹¹ Joan McAuley, 'McMaster Oral History - Dr. J.E. Anderson - 2nd February 1979.' Interview transcript from 1979. Founding Fathers Interviews - HHS/FHS Archives, McMaster University, Hamilton, Ontario, 24.

REVOLUTIONS & RE-ITERATIONS

John Evans and Fraser Mustard, as the first and second Deans of the School of Medicine, are often credited with the development of the educational programme. Whilst their influence and involvement was significant, the real brains behind the successful inception and development of the first Problem Based Learning programme was Bill Spaulding. He not only ruled the Education Committee, but also all of the sub-committees created to deal with various parts of the programme. His control over the sub-committees is highlighted by the minutes of a Joint Meeting of the Phase III Planning and Education Committees held in 1968 in which he imposes centralised control of the programme development by the Education Committee:

Dr. Spaulding emphasized that the education committee would be responsible for decisions of curriculum design and presentation methods. He warned against the planning sub-committees undertaking to design or plan a day-to-day programme for their respective organ systems as well as, against using this approach to define the material considered relevant to an undergraduate medical programme.⁹²

But Spaulding's contribution to the programme went much further and deeper than merely herding his colleagues towards his intended objectives. Indeed, archival evidence suggests that Spaulding himself wrote the vast majority of the memoranda that circulated amongst the Education Committee between 1966 and early 1969 – producing hundreds of pages of text upon which his colleagues were invited to react. In particular, Spaulding proposed the first comprehensive revision of Evans' original paper and *de facto* constitution of the School in 1968.⁹³ This document will be discussed at length in later on, but it should be noted that whilst Evans' document offered an abstract perspective on the programme, Spaulding's revision reads like an implementation blueprint. Interestingly for a man so concerned with the nuts-and-bolts of the programme, Spaulding chose to open his founding treatise with a quote from the Great Didactic of Comenius⁹⁴ - the 16th Century Moravian scholar: “Let the main objectives be as follows; to seek and find a method of instruction by which teachers may teach less, but learners may learn more” The Great Didactic of Comenius, a famous educator (1592-1670).⁹⁵

Spaulding's interest in Comenius seems to have been rather idiosyncratic – none of the other founding fathers make mention of his work in any archival materials, and the name 'Comenius' did not appear in any of the interviews conducted at McMaster. Neither does Spaulding mention any other intellectual influence after this paper – leading us to surmise that he would have stumbled upon Comenius at some stage during his pre-McMaster years, read it, found it of interest, and let it loosely influence his conception of medical education while retaining his pragmatic character.

⁹² James Kraemer, 'Joint Meeting of Phase III and Education Committees'. Minutes from 1968. Educational Programme Committee - 1968 - HHS/ FHS Archives, Box 232.4;6. McMaster University, Hamilton, Ontario.

⁹³ William Spaulding, 'The Undergraduate Medical Curriculum: McMaster University - Oct 31 1968.' Report from 1968. Objectives of the Faculty School of Medicine - HHS/FHS Archives, Box 145.8;1. McMaster University, Hamilton, Ontario. It is useful to note that Spaulding began working on draft versions of the document in 1967 and proposed several revisions along the way, guided by comments of his colleagues.

⁹⁴ Comenius wrote his *Didactica Magna* in Latin. Given the challenges of tackling the text in its original form, we shall be using the following translation for the purposes of this treatise: Maurice W. Keatinge, *The Great Didactic of John Amos Comenius: translated into English and edited with biographical, historical and critical introductions* (New York: Russell & Russell, 1967).

⁹⁵ Spaulding, 'The Undergraduate Medical Curriculum', 2.

In addition to his internal publications, Spaulding was also the first to publish a description of the curriculum in a scientific journal in 1969.⁹⁶ His contributions to the development of the programme were recognised by John Evans himself in 1979:

I guess I have one disappointment - that more recognition of the remarkable contribution of Bill Spaulding hasn't appeared in the area. ... Bill Spaulding was a key figure in all of it. It wasn't just the Education Committee; it was in the primary care development of the medical practice ... and [he] played a foster-parent role in helping to get started in the first days. There were so many different areas, the library and all sorts of things, where Bill Spaulding's wisdom and his tenacity, willingness to be stubborn and not give in, compromise and so on were reflected in very significant achievements.⁹⁷

This was confirmed 33 years later by his former colleague Barber Mueller, who contrasted the contributions of two Founding Fathers in the setup of the programme: 'On a scale of 10, I'll put Bill at 10 and Fraser Mustard at 4, in terms of organising this programme'.⁹⁸ Whilst running the Education Committee, Spaulding continued to work as a clinician, and headed the Diabetic Clinic of McMaster University⁹⁹. He continued to work at McMaster until his retirement in 1987, whereupon he was made Professor Emeritus of the School.¹⁰⁰ In 1991, he published his last major work and the only existing comprehensive historical account of McMaster's educational revolution: *Revitalizing Medical Education, McMaster Medical School the Early Years 1965-1974*.



Dr. James Edward Anderson
Founding Chairman of the Anatomy Department
Founding Chairman of Phase I
*Founding Member of the Education Committee*¹⁰¹

If Bill Spaulding was the brains of the McMaster Revolution, then Dr. James 'Jim' Anderson was certainly its heart. Few would disagree with Howard Barrows' appraisal of his former colleague: 'Anderson was a sensitive, dedicated physician, pioneering educator, and humanist. All of us working with PBL owe him a lot'.¹⁰² Indeed, as the first Chairman of Phase I and thus the person responsible for the very first student experience of small-group, problem-based learning, Anderson shaped the face of PBL at McMaster to an all-permeating and enduring extent.

⁹⁶ William B. Spaulding, 'The undergraduate medical curriculum (1969 model): McMaster University', *Canadian Medical Association Journal* 100, no.14 (1969): 659.

⁹⁷ McAuley, 'McMaster Oral History - Dr. J.R. Evans'.

⁹⁸ Mueller, in interview with the author, October 25 2012

⁹⁹ 'Living History - University of Toronto Faculty of Medicine, William Bray Spaulding | Living History', 2012. Accessed December 6, 2013. <http://livinghistory.med.utoronto.ca/people/william-bray-spaulding>

¹⁰⁰ 'Living History - University of Toronto Faculty of Medicine, William Bray Spaulding'

¹⁰¹ Image source: Faculty of Health Sciences, McMaster University. Accessed December 4, 2013 fhs.mcmaster.ca

¹⁰² Howard S Barrows, 'In Memoriam: James E. Anderson, MD', *Teaching and Learning in Medicine*, 8, no. 1 (1996): 61.

REVOLUTIONS & RE-ITERATIONS

At the age of 40, Anderson was already an accomplished anatomist when he joined McMaster from the University of Toronto in 1966. He brought to McMaster the legacy of his former teacher John C.B. Grant¹⁰³ - a world-famous Canadian anatomist¹⁰⁴ - in the form of revolutionary ideas on the teaching and learning of anatomy. Indeed, Anderson did away with the cadaver room and the mandatory dissections for first year students, for reasons outlined by Arthur Leader, one of his former students:

So my brother went to medical school in Toronto – spent several hours a day dissecting a cadaver Anderson said: “Well, what you really want to do is look at the anatomy. And so you don’t have to do the actual dissection unless you want to be a surgeon”.¹⁰⁵

Instead, Anderson built up a one-of-its-kind Anatomy Lab in which students could work with plastic embedded anatomical specimens, plastic models, X-rays and prosected cadavers.¹⁰⁶ This lab became the students’ first ‘Homebase’¹⁰⁷ - the physical manifestation of their self-study space, which was so important to the early PBL experience that ‘students began and finished their academic day in the lab’.¹⁰⁸ Jim Anderson’s influence on the McMaster programme was greatest in its very early years.¹⁰⁹ After he left in 1975, the role of the ‘Homebase’ was substantially reduced.¹¹⁰

Whereas one student treasured Anderson’s caring and compassionate approach to medical education, calling him the ‘soul of our first year’,¹¹¹ another still recalls the feelings of anxiety brought about by the Anderson approach to learning:

Now, unfortunately, Jim Anderson was the Professor of Anatomy. And so whenever we tried to figure out what is important to learn and what isn’t important to learn, he said: “Oh, it doesn’t matter, you just learn what you want!” ... Well, not in these words, but he didn’t want to be tied down in any way and so we were in a tremendous sense of insecurity.¹¹²

Indeed, Anderson was neither a man of structure nor rationalised planning. He is described as an ‘innovator and experimenter’,¹¹³ a ‘radical’,¹¹⁴ ‘the crazy guy’,¹¹⁵ ‘the Woodstock character’¹¹⁶ and ‘the creative spark’¹¹⁷ by his former colleagues who would probably agree

¹⁰³ SM Jerkic, ‘The Influence of James E. Anderson on Canadian Physical Anthropology.’ In: *Out of the Past: The History of Human Osteology at the University of Toronto*, ed. L Sawchuk and S Pfeiffer, (University of Toronto at Scarborough: CITDPress, 2001). Accessed December 4, 2013.

<http://citdpress.utoronto.ca/osteology/pfeiffer.html>:

¹⁰⁴ KL Moore ‘John Charles Boileau Grant.’ Authored 2012, accessed December 4, 2013.

<http://www.anatomy.org/content/john-charles-boileau-grant>

¹⁰⁵ Arthur Leader, (*Student in the first cohort of McMaster*) in interview with the author by telephone, October 19, 2012

¹⁰⁶ Barrows, ‘In Memoriam’, 61.

¹⁰⁷ McAuley, ‘McMaster Oral History - Dr. J.E. Anderson’

¹⁰⁸ Bruce Wainman, ‘History of the Education Program in Anatomy’, 2013. Accessed December 4, 2013. <http://fhs.mcmaster.ca/anatomy/history.html>

¹⁰⁹ Bloch, in interview with the author, October 23, 2013.

¹¹⁰ McAuley, ‘McMaster Oral History - Dr. J.E. Anderson’

¹¹¹ Leader, in interview with the author, October 30, 2012.

¹¹² Bloch, in interview with the author, October 23, 2013.

¹¹³ Smith, in interview with the author, July 10, 2013.

¹¹⁴ Hamilton, in interview with the author, November 12, 2012.

¹¹⁵ Kraemer, in interview with the author, November 20, 2012.

¹¹⁶ Sweeney, in interview with the author, October 25, 2012.

¹¹⁷ Norman, in interview with the author, October 20, 2013.

with his former students' assessment that Jim Anderson was a man 'who wanted to tear down structures'.¹¹⁸ Anderson, recalling a tragicomic visit to Oral Roberts University, described his own rebellious tendencies in the witty style for which he was known:¹¹⁹

It's really quite a terrible place. It is very tinselly and there are a number of things you can't do on campus and it's amazing when you can't do things how much you want to do them. You can't smoke, drink or swear anywhere within the precincts and about 9:15 I was having terrible desires to smoke, drink and use obscene language which Bill Spaulding was enjoying because Bill is noted for not smoking, drinking or using obscene language and seemed to incite me to riot.¹²⁰

But Anderson was not your typical 1970s flamboyant radical. He was a quiet and shy¹²¹ devout Catholic¹²² revolutionary, a 'sweetie'¹²³ moved by a deep compassion for the youth and true educational dedication. His tragic personal circumstances¹²⁴ may have played a role in his devotion to disoriented teenagers in the community of Burlington, on the outskirts of Hamilton. The 'Cool School' (as it became known), set up by Anderson during his time at McMaster, became the educational home of the community's recovering teenage drug addicts and other troubled teens. The school is best described by Anderson's former colleague John Hamilton:

There was no institution, it had a lounge room, a place they could study, a bit of a library. Jim was overall making sure things went well, but if somebody said: "Look, I'd like to study ancient history", he would say "OK, I'll find somebody in the university who would be willing to act as your expert to consult with. And another person who will tutor you but not necessarily as an expert in that particular topic. It'll just be the person you relate to, that meets with you and so on. And you decide yourself how you're going to go. We're not going to have any exams, we're not going to have any competition, you take your own pace, you do what you want, but we're here and so on".¹²⁵

The school attracted the support of several local and state institutions but in terms of effect, some reported mixed results: 'and it had some very brilliant successes in some very few kids who were exceptional and if you gave them the opportunity, they could succeed. But it kind of failed on the majority of the students who came there'.¹²⁶

Nonetheless, his efforts won him the award of Hamilton's Citizen of the Year in 1974¹²⁷ and the admiration of his colleagues and former students, 40 years on. Anderson remained as Chair of Anatomy until 1975, and stayed on as a Faculty member of McMaster University School of Medicine until 1988.

¹¹⁸ Bloch, in interview with the author, October 23, 2013.

¹¹⁹ Barrows, 'In Memoriam', 61.

¹²⁰ McAuley, 'McMaster Oral History - Dr. J.E. Anderson' 13.

¹²¹ Barrows, 'In Memoriam', 61.

¹²² Leader, in interview with the author, October 30, 2012

¹²³ Mueller, in interview with the author, October 25, 2012

¹²⁴ Anderson lost a young son to a tragic accident prior to his involvement at McMaster (Norman, in interview with the author, October 20, 2013).

¹²⁵ Hamilton, in interview with the author, November 12, 2012.

¹²⁶ Bloch, in interview with the author, October 23, 2013.

¹²⁷ 'Community of Distinction', Faculty of Health Sciences McMaster University, accessed December 6, 2013, http://fhs.mcmaster.ca/main/community_of_distinction

Dr. William J. Walsh
Founding Assistant Dean
*Founding Member of the Education Committee*¹²⁸



Dr. William ‘Bill’ Walsh, an internist trained at the University of Toronto, was 41 years old when he was approached by John Evans to become McMaster’s first Assistant Dean of Medicine – a position in which he served until 1990!¹²⁹ Bill Walsh was one of Evans’ first recruits and joined the Education Committee from the moment of its inception. In addition to his role in the general planning of the curriculum, Bill Walsh was responsible for organizing Phase IV, the clinical part of the MD programme.¹³⁰

His primary role, however, seems to have been bringing the town of Hamilton and the existing medical structures of Ontario on board with the McMaster project. Indeed, Spaulding recalls in his book that Walsh was appointed to the College of Physicians and Surgeons of Ontario with a mission to convince them that their role in the setting up of the school was merely one of licensing, rather than curriculum design – thus giving a free hand to the Founding Fathers.¹³¹ Spaulding further relates the story of the University of British Columbia whose lack of integration with the local medical profession caused the collapse of certain creative ideas they might have had about medical education.¹³² By contrast, and in part due to Walsh’s efforts, in 1966, the provincial government of Ontario approved the construction of a Health Sciences Centre in Hamilton. And thus, in Spaulding’s words: ‘McMaster laid the foundation for cross-disciplinary cooperation both within McMaster University and with the local health sciences community from the start’.¹³³

Walsh’s former colleague Dave Sackett vividly described Walsh’s role in bridging gown and town:

Bill Walsh was the best clinician in town, he was a general internist, and was the doctors’ doctor. So he’d been here long before he ever showed up. John Evans, recognising his intelligence, and winning him over to the idea of the medical school - so early on, Bill Walsh was one of the first recruits and became... uh, I don’t know, vice-president or something for Health Sciences. And Bill played just a hugely important role in bringing together all of the weird guys coming into the university with the pre-existing medical establishment in town. ... And without the tons of stuff that he did, we never would have had the, compared to other schools, idyllic honeymoon experience with the folks in town.¹³⁴

¹²⁸ Image source: Faculty of Health Sciences, McMaster University. Accessed December 4, 2013 fhs.mcmaster.ca

¹²⁹ ‘Profiles of the Founders of McMaster Cardiology’ Faculty of Health Sciences McMaster University, accessed December 10, 2013: <http://fhs.mcmaster.ca/cardiology/history/profiles.html>

¹³⁰ William Walsh, ‘Progress Report - Phase IV - July 18, 1969’ Report from 1969. Educational Programme Committee - 1969 - HHS / FHS Archives, Box 232.5;3. McMaster University, Hamilton, Ontario.

¹³¹ Spaulding, *Revitalizing Medical Education*, 68.

¹³² Spaulding, *Revitalizing Medical Education*, 118.

¹³³ Ibid.

¹³⁴ Sackett, in interview with the author, October 25, 2012

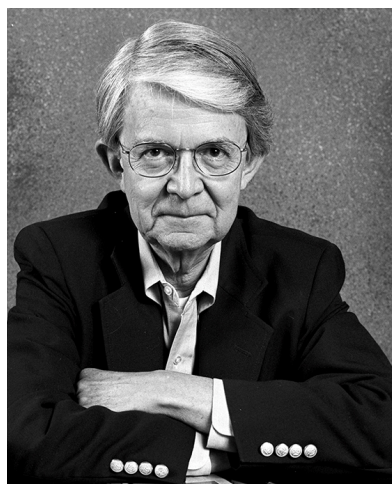
Like Bill Spaulding, Walsh had a reputation for having a sturdy character, as depicted by Kinsey Smith: '[Bill Spaulding] and Bill Walsh ... were just absolutely solid, reliable people who believed what we were doing was right and just quietly got on and did it'.¹³⁵

Anderson characterised Walsh as a man of good spirits – a get-up-and-go, practical sort of person who just kept things moving with the programme:

When our spirits plunged to the depths and when things weren't working, Bill Walsh was the one who whipped us back into shape and reminded us to count our blessings. [...] Bill was also excellent at getting things organised on paper. For example, when Fraser and I run off at the mouth with these wonderful plans but would never quite get round to organising them in a way that would come off, Bill was the one who just happened to have taken some notes and be able to pull us together.¹³⁶

Bill Walsh held the position of Assistant Dean longer than anybody else at the School of Medicine (1965-1990). In addition to his position as Assistant Dean, Walsh held the positions of President of the Hamilton Academy of Medicine, President of the College of Physicians and Surgeons of Ontario, and Director of Continuing Medical Education at McMaster.

The Howard S. Barrows Legacy



For many, the acronym PBL is inextricably associated with the name Howard Barrows.¹³⁷ Indeed, many a paper credits this charismatic Californian neurologist's work with the founding of PBL.¹³⁸ The Faculty of Health Sciences of McMaster University itself recently named Barrows an 'architect' of PBL.¹³⁹ However, archival evidence pinpoints Barrows' first appearance at the Education Committee to September 6, 1968¹⁴⁰ - that is, two years after Evans' Founding text and the formation of the Education Committee. As Spaulding's Comenius-infused manifesto of the MD programme dates from October 1968,¹⁴¹ it is unlikely that Barrows would have had much influence on its drafting.

¹³⁵ Smith, in interview with the author, July 10, 2013.

¹³⁶ McAuley, 'McMaster Oral History - Dr. J.E. Anderson', 25.

¹³⁷ Image source: Wikimedia commons.

¹³⁸ For instance: Harry Hillen, Albert Scherpbier, and Wynand Wijnen, 'History of problem-based learning in medical education'. In: *Lessons from problem-based learning*, ed. Henk van Berkel, et al. (New York: Oxford University Press: 2010), 5-12. Bob Price, 'Problem-based learning the distance learning way: a bridge too far?' *Nurse Education Today*, 20 (2000), 98-105. Graham D. Hendry, Miriam Frommer, and Richard A. Walker, 'Constructivism and problem-based learning', *Journal of further and higher education* 23, no. 3 (1999), 369-371. Siobhan Murphy et al., 'Merging Problem-Based Learning and Simulation as an Innovative Pedagogy in Nurse Education.' *Clinical Simulation in Nursing* 7, no. 4 (2011), e141-e148.

¹³⁹ Faculty of Health Sciences McMaster University. 'Barrows remembered for contributions to education', *McMaster Faculty of Health Sciences Newsmagazine* 5, no. 2, (2011). Accessed December 23, 2013. http://fhs.mcmaster.ca/networkfall2011/barrows_howard.html

¹⁴⁰ James Kraemer, 'Education Committee Meeting - September 6, 1968.' Minutes from 1968. Educational Programme Committee - 1968 - HHS/ FHS Archives, Box 232.4;6. McMaster University, Hamilton, Ontario.

¹⁴¹ Spaulding, 'The Undergraduate Medical Curriculum', 2.

In a posthumously published book chapter in which he retraced his intellectual history, Barrows even named Jim Anderson his mentor, crediting him for the inception of PBL.¹⁴² If this is so, then why has Howard Barrows so often been named the originator of PBL even though he himself never claimed it? Given the available published, archival and oral evidence, it is possible to reconstruct a likely scenario that led to the confusion surrounding Barrows' involvement with PBL.

In the earliest days of the McMaster Medical School, little attention was given to publishing academic papers on the topic of the undergraduate curriculum by its faculty. As we have seen, the first publication on the subject can be traced back to 1969, by the hand of Bill Spaulding.¹⁴³ But after this initial attempt, whilst archival evidence indicates that internal publications were rife,¹⁴⁴ published contact with the outside world was rare.¹⁴⁵ Barrows' 1974 publication with Victor Neufeld, solemnly titled 'The 'McMaster Philosophy': An Approach to Medical Education' would have read like something of a manifesto to the world of medical education. For those not familiar with the names Evans and Spaulding (particularly for medical educators outside of Canada), the names Neufeld and Barrows would have become associated with this new educational method.¹⁴⁶ The association was likely cast in stone with the publication of *Problem-Based Learning, An Approach to Medical Education*, which Barrows authored with his assistant Robyn Tamblin in 1980.¹⁴⁷ This was the first comprehensive book on both problem-based learning and the McMaster curriculum. Geoffrey Norman, who was working under Neufeld at the time, confirmed this hypothesis when asked why the name Barrows was associated with the founding of PBL:

That book and the paper that he and Neufeld wrote called: "The McMaster Philosophy", which appeared in the Journal of Medical Education". That's why. And Neufeld would admit that, and Barrows admitted this to me. That basically, they popularized it, but they didn't invent it.¹⁴⁸

The fact that some medical education scholars referred to the 'original Barrows and Tamblin method'¹⁴⁹ is further proof that the 1980 book was indeed the starting point of the 'Barrows Founding Father' myth. In addition to publishing, Barrows became very active in helping to develop PBL programmes in countries around the world. His name is bound to the history of

¹⁴² Howard S. Barrows, 'An Accidental Educator.' In: *Students Matter: The Rewards of University Teaching*, ed. J. Kevin Dorsey, and P.K. Rangachari, (Springfield, IL: Southern Illinois University School of Medicine: 2012).

¹⁴³ Spaulding, 'The undergraduate medical curriculum (1969 model)', 659.

¹⁴⁴ A search through the archives reveals that between 1966 and 1970, over 60 internal reports and memoranda were published for the benefit of the education committee on the subject of the curriculum and medical education. This only includes papers specifically drafted for the Education Committee and which were kept by the archivists over the years. The actual number of reports may be much higher.

¹⁴⁵ Numbering four in total. Aside from the 1969 Spaulding paper, there was also:

E.J. Moran Campbell, 'The McMaster Medical School at Hamilton, Ontario', *The Lancet* (1973): 763–767. Victor R. Neufeld and William B. Spaulding, 'Use Of Learning Resources At McMaster University', *The British Medical Journal* 3, no. 5871 (1973): 99–101.

William B. Spaulding and Victor R. Neufeld, 'Regionalization Of Medical Education At McMaster University', *The British Medical Journal* 3, no. 5871 (1973): 95–98.

¹⁴⁶ Victor R. Neufeld and Howard S. Barrows, 'The "McMaster Philosophy": An Approach to Medical Education'. *Journal of Medical Education* 49, no. 1974, 1040–1050.

¹⁴⁷ Howard S. Barrows and Robyn M. Tamblin, *Problem-based learning, An Approach to Medical Education* (New York: Springer: 1980).

¹⁴⁸ Norman, in interview with the author, October 20, 2013

¹⁴⁹ Hendry, Frommer, and Walker, 'Constructivism and problem-based learning, 369–371.

PBL programmes such as the one that opened its doors in 1979 in New Mexico.¹⁵⁰ Scott Obenshain, one of the founders of this sister programme, recalls Barrows' involvement:

Luckily, Dr. Howard Barrows was making a site visit to New Mexico, to University of New Mexico to sort of do a site visit for a pulmonary education grant. So we offered to take him to dinner if he could tell us about PBL. So that's where PBL came in. And then we then started working with Dr. Barrows, visited McMaster on a number of occasions and it seemed that what we wanted to do, i.e. get physicians into rural underserved areas, Problem-based learning would make more sense than most... than any sort of memory based education that was... sort of what was still the standard. ... We worked with Dr. Barrows, we worked with the people at McMaster and learned a lot from them. Tried to recruit Dr. Barrows, but that didn't work out. And so decided we had to go ahead and so we started our separate Problem-based track, with 10 students in the programme out of the total of 75 in the medical school in 1979.¹⁵¹

The combination of Barrows' publishing record and his involvement in developing medical education around the world probably served to bind the names 'Barrows' and 'PBL' together in the mind of educators globally. Since the Founding Fathers were not world travellers and,¹⁵² until Spaulding's publication of his historical treatise on McMaster in 1991, none of them published their own account of the programme, their names were largely lost outside of Canadian medical education circles.

If Barrows was not the founder of PBL as claimed, he was nonetheless very much associated with the programme between 1968 and 1980.¹⁵³ As early as April 1968, the Committee was 'was enthusiastic about inviting Dr. Barrows to spend his sabbatical year at McMaster, provided of course, he is interested in doing so'.¹⁵⁴ Indeed, upon his arrival, Barrows became, according to records of attendance kept by James Kraemer, one of the first people other than the Founding Fathers to join the council, even though he was only at McMaster on sabbatical leave.¹⁵⁵

Ralph Bloch recounts the story of Barrows' journey from the University California Los Angeles to McMaster:

Howard Barrows was, I think, Assistant Professor of Neurology at Los Angeles County Hospital, part of University of Southern California. He was a neurologist, and I think he was a good neurologist, and he was interested in education. So there were all these young starlets¹⁵⁶ around who didn't have much to do and that was probably quite attractive to a young man, and so he started hiring them and teaching them neurological diseases¹⁵⁷. ... So he made his name as somebody who introduced a new way of teaching and learning clinical examination and history taking. It wasn't very structured in those days, that's also a process that evolved, but it was fantastic because, you know, letting young students loose on unsuspecting

¹⁵⁰ Arthur Kaufman, *Implementing Problem Based Learning in Medical Education* (New York: Springer, 1985).

¹⁵¹ Scott Obenshain, in interview with the author, June 21, 2013.

¹⁵² With the possible exception of John Evans, but he was no longer associated with the programme from 1972 onwards.

¹⁵³ Barrows, 'An Accidental Educator', 9.

¹⁵⁴ James Kraemer, 'Education Committee Meeting - April 8, 1968'. Minutes from 1968. Education Committee Minutes - April-June 1968 - HHS / FHS Archives, Box 232.4;5. McMaster University, Hamilton, Ontario.

¹⁵⁵ Kraemer, 'Education Committee Meeting - September 6, 1968'.

¹⁵⁶ When asked to clarify, Ralph Bloch specified that he meant young unemployed Hollywood actresses.

¹⁵⁷ This was confirmed by Howard Barrows in a posthumous publication: 'I wondered if someone could be taught to simulate a patient. I found a woman who was an art model employed by the university's art department. She agreed to be trained and then be interviewed and examined by a series of medical clerks. Later, I used a variety of actors who were out of work. (There were many in this Hollywood area)', in Barrows, 'An Accidental Educator', 3.

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patients to get their first experience may not be ideal but these standardized... in those days they were called “programmed patients” – they could give us a defined history and also give feedback to students about what they did right and what they didn’t do right and so. In 69, Howard did a sabbatical at McMaster to introduce programmed patients, standardized patients. ... And he got to know Problem-based learning while he was here in Hamilton. And he then adopted it as his own invention.¹⁵⁸

All accounts, including his own, seem to confirm that Barrows’ true concern for medical education lay with the training and use of Programmed or Simulated Patients. The minutes of Education Committee suggest that it was out of interest for Barrows’ unusual ideas about learning resources that he was called into their midst. In his first appearance amongst the Founding Fathers, the minutes indicate that ‘Dr. Barrows confirmed that his programmed patient could be brought to McMaster for several days, towards the end of October, to demonstrate the technique to interested persons’.¹⁵⁹ In addition to programmed patients, Barrows developed a keen interest in what he dubbed ‘problem-boxes’.¹⁶⁰ These were decks of coloured cards that ‘contain a printed clinical problem manual and related study materials on differing media (reprints, books, colour slides, 8 mm film loops, audio tape cassettes). The problem is presented to the student in a manner similar to the way it unfolds to the clinician’¹⁶¹. Students were expected to use these cards sequentially to train themselves to reason their way through clinical cases.¹⁶²



Figure 2: Problem Boxes

A reading of Barrows & Tamblyn’s 1980 publication gives the distinct impression that simulated patients and problem-boxes played a major part in McMaster’s curriculum. At least four of the books’ chapters describe and prescribe the use of these tools in various learning settings, from self-study to summative assessment.¹⁶³ The book describes in detail a tutorial setting in which a simulated patient is the centre-point of the problem.¹⁶⁴ In his 1974 paper published together with Victor Neufeld, Barrows asserted that Problem Boxes were a key McMaster feature – and went on to describe them in detail.¹⁶⁵ But how generally representative of the McMaster philosophy was this?

Looking at a representative selection of the curriculum-related publications issued by McMaster’s faculty members between 1969 and 1980, we can observe the following:

¹⁵⁸ Bloch, in interview with the author, October 23, 2013.

¹⁵⁹ Kraemer, Education Committee Meeting - September 6, 1968.

¹⁶⁰ Howard S. Barrows, and Donna L.M. Mitchell, ‘An innovative course in undergraduate neuroscience Experiment in problem-based learning with “problem boxes”’, *Medical Education* 9, no. 4 (1975), 223–230.

¹⁶¹ Barrows and Mitchell, ‘An innovative course’, 223.

¹⁶² See picture (taken by the author). These problem boxes were recovered courtesy of Dr. PK Rangachari.

¹⁶³ Barrows and Tamblyn ‘Problem based learning’, Chapters 4, 5, and p. 127.

¹⁶⁴ Barrows and Tamblyn ‘Problem based learning’, 76.

¹⁶⁵ Neufeld and Barrows, ‘The “McMaster Philosophy”’, 1045.

Publication	Simulated Patients	Problem Boxes
Spaulding, 1969 ¹⁶⁶	Not mentioned	Not mentioned
Campbell, 1970 ¹⁶⁷	Not mentioned	Not mentioned
Neufeld & Spaulding, 1973 ¹⁶⁸	Listed as a learning resource for problem-solving	Listed as a learning resource for problem-solving
Neufeld & Barrows, 1974 ¹⁶⁹	Described in the context of learning resources	Described in the context of learning resources
Barrows & Mitchell, 1974 ¹⁷⁰	Developed extensively	Developed extensively
Hamilton, 1976 ¹⁷¹	Mentioned briefly as a new type of problem available at McMaster	Not mentioned
Ali <i>et al.</i> , 1977 ¹⁷²	Not mentioned	One of several learning resources mentioned.
Barrows & Tamblyn, 1980 ¹⁷³	Developed extensively	Developed extensively

Table 3: The Role of Simulated Patients & Problem Boxes according to Published Material 1969-1980

It would seem that published accounts contemporary to Barrows' stay at McMaster were divided as to the importance of simulated patients and problem boxes as learning resources in the curriculum. From this table, we can legitimately surmise that both were recognized as available and valuable learning resources. However, the extent of their actual use remains questionable. Publications authored by Barrows feature these methods more prominently and in more detail than other publications but the sample size is too small and scope of the publications too diverse to be conclusive. Spaulding's 1991 historical account of the programme briefly mentions Barrows' Simulated Patients and Problem Boxes, but the implication is that they were just one learning resource among many.¹⁷⁴ Archival evidence is inconclusive by its absence: all mentions of simulated patients in the minutes of the Education Committee between 1966 and 1970 are in conjunction with the work of Howard Barrows. Whilst this would tend to indicate that Barrows' methods remained in his hands alone, it is not enough to make a decisive statement on the matter.

Oral evidence, provides a more definite, if equally divided picture. Talking about the Problem Boxes, James Kraemer, who served as education coordinator of the programme during the early years, traces their evolution from 'gimmick' to 'learning resource':

So it was cards, it was slides, it was a little bit of everything. He had tapes, he had slides in it, there was a whole bunch of things that Howard did. It was a gimmick that he got into... and it became less of a gimmick and more of a... learning resource, then other people caught onto it. That almost became a jargon term in

¹⁶⁶ Spaulding, 'The undergraduate medical curriculum (1969 model)', 659.

¹⁶⁷ Campbell, 'The McMaster Medical School', 763–767.

¹⁶⁸ Neufeld and Spaulding, 'Use Of Learning Resources', 99–101.

¹⁶⁹ Neufeld and Barrows, 'The "McMaster Philosophy"', 1045.

¹⁷⁰ Barrows and Mitchell, 'An innovative course', 223–230.

¹⁷¹ John D. Hamilton, 'The McMaster Curriculum: A Critique.' *The British Medical Journal* 1, no. 6019 (1976), 1–7.

¹⁷² Mohammed A Ali, et al. "Blood and guts": one component of an integrated program in biologic sciences as applied to medicine', *Canadian Medical Association Journal* 116, no. 1 (1977), 59.

¹⁷³ Barrows and Tamblyn, 'Problem-based learning'.

¹⁷⁴ Spaulding, *Revitalizing Medical Education*, 63.

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McMaster's context, right? We had a problem box. Nobody would say it was problem box learning, but anyways...¹⁷⁵

This would seem confirm the position conferred to problem boxes (Kraemer did not mention simulated patients) by the published materials above; namely that of a legitimate learning resource amongst others. But it does not say anything about their importance, relative to other resources. When asked about the use of simulated patients, Mo Ali, who was Chairman of Phase III until 1978, confessed: 'I don't think I used it in phase III at all'.¹⁷⁶ Given that Phase III was the longest Phase of the programme, this would pose a serious challenge to the idea that simulated patients were a major educational tool at McMaster. Arthur Leader recalls that during his studies, simulated patients were not used at all during Phases I to III. Instead, he states, 'it was mainly in the clerkship year. In the least year I think, as I recall. The last year, the clerkship year in which you had the simulated patients in conjunction with your clinical rotation'.¹⁷⁷ A divided picture thus emerges in which both problem boxes and simulated patients are listed as important learning resources at McMaster by the work of Barrows, amongst others, all the while being considered of marginal importance by a former student and programme manager.

So how does one make sense of these mixed accounts? Some of the interviewees for this work had a theory to propose. For instance, Kinsey Smith proposes the following account:

Not everybody bought into what Howard Barrows was talking about. And Howard Barrows was a theorist rather than a practitioner in many ways. Vic Neufeld, the same applied to. He was given credit as a "guru" but down at group level on the shop floor, there were a lot of people just doing things which worked well. And not always writing them up.¹⁷⁸

The idea that Barrows worked in some form of isolation from the actual happenings in the undergraduate programme was confirmed by Geoffrey Norman, who assisted Barrows in his early research at McMaster:

At some point Barrows and Tamblin basically got side-lined, and they developed their specialty in a neurology where she was a nurse neurologist practitioner and they did all sorts of stuff like developing the P4 deck. Portable Patient Problem Pack...¹⁷⁹

Thus, the evidence enables us to propose a theory of the importance of the learning methods of Howard Barrows at McMaster in terms of actual use for educational purposes. When he joined the Faculty of McMaster on a permanent basis in the early 1970s, Barrows was put in charge of the Neurology – Locomotor – Psychiatry unit. It would seem that unit planners had quite some freedom to experiment with educational methods within the wide label of small-group problem-based learning¹⁸⁰. It is quite possible that Barrows developed both Problem Boxes and Simulated Patients to a great extent within the realm of his unit, but that other units made little or no use of them. Archival material did not credit Barrows with any larger

¹⁷⁵ Kraemer, in interview with the author, by telephone, November 20, 2012

¹⁷⁶ Ali, in interview with the author, at McMaster University, October 30, 2012

¹⁷⁷ Leader, in interview with the author, by telephone, October 19, 2012

¹⁷⁸ Smith, in interview with the author, by telephone, July 10, 2013

¹⁷⁹ Norman, in interview with the author, at McMaster University, October 20, 2013

¹⁸⁰ According to the account of Smith, in interview with the author, by telephone, July 10, 2013 and Ali, in interview with the author, at McMaster University, 30th October 2012

administrative responsibility in the MD programme. It is likely therefore that he instead dedicated a significant portion of time to publication and promoting PBL to the outside world – something which would be consistent with the course of his later career. The differing accounts surrounding the work of Barrows at McMaster could be explained by the fact that the medical school offered more of a mosaic of education practices than a party-line discourse on PBL – therefore, depending on which part of the picture a particular person saw, they might have measured the importance of Barrows works more highly than others. It remains the considered opinion of the author, given the overall evidence, oral, published and archival, that simulated patients and problem boxes were of overall marginal use in the undergraduate MD programme at McMaster while Barrows was a member of its Faculty.

The Early Education Committee

Archival evidence suggests that it is fair to say that McMaster owes the foundations of its undergraduate medical programme to the five Founding Fathers. Evans assembled his four trusted friends in what became known as the Education Committee (EC) in 1966, and until early 1968, that committee comprised solely of the four. The role and importance of the EC was outlined by Mueller in his retrospect on McMaster: ‘one of the first – perhaps the most significant – actions at the medical school was the formation of a four-man Education Committee that was responsible for all education and evaluation activities’.¹⁸¹ Indeed, the vast majority of contributions to McMaster’s collection of reports, memoranda and position papers between 1966 and 1968 were by the founding four, with Spaulding clearly in the lead. However, toward the end of 1967 and the beginning of 1968, other characters came into the picture, thus breaking Spaulding, Anderson, Mustard and Walsh’s monopoly on the framing of the educational programme. The EC defined many of the key structural aspects of the programme, and until 1969, it had something of an omnipotent role over the MD curriculum. At the cusp of 1970, however, with the programme now in place and the founding fathers’ reign coming to an end, a reconsideration of the EC’s role became necessary.

New characters

The first recorded novel attendance to the Education Committee is Jim Kraemer, in April 1968.¹⁸² Kraemer, a social sciences graduate, was hired in as the Education Coordinator – this means that it fell to him to ensure communication between the Education Committee and the various sub-committees that worked under it. Kraemer also became a sort of scribe to the Education Committee, and from his first appearance therein until his departure at the end of 1973, he diligently minuted every meeting of the EC, producing many of the archival records on which this thesis based.¹⁸³ With the inclusion of a scribe, the EC was ready for expansion,

¹⁸¹ C. Barber Mueller, ‘McMaster University Medical School: The Little School that Could – and Did’, *McMaster University Medical Journal* 5, no 1 (2008): 29.

¹⁸² Kraemer, ‘Education Committee Meeting - April 8, 1968’.

¹⁸³ Kraemer, in interview with the author, November 20, 2012.

and indeed, Howard Barrows, John Hamilton, C. Barber Mueller, Alec Adsett, Dave Sackett and Moran Campbell all joined in Education Committee discussions towards the end of 1968.

These are not trivial names in the context of the development of McMaster's educational programme. We saw that Mueller described some of these names as 'founding fathers' to the same extent as the five that we have already encountered. Whilst it could be argued that such a comparison is unfair given the comparative contributions, aggregated archival evidence suggests that these people pulled some considerable weight in the education debates that sprung up on the eve of McMaster's opening year.

Of particular noteworthiness is the British respirologist Moran Campbell, who became the school's first Chair of Medicine – a post which, Spaulding recounts, was not easy to fill due to a general opposition to the idea of having a Department of Family Medicine at the Medical School¹⁸⁴ - and yet, it seems that the eccentric Dr. Campbell took it in his stride. Campbell has been described as a dynamic, committed educator,¹⁸⁵ and a man of incredible intellect.¹⁸⁶ In a typically British obituary, Howell, Dickinson and Hamilton joked of Moran Campbell that: 'in 1968 he was the most chair-worthy clinical academic in the United Kingdom without a chair, probably because his academic brilliance was offset by his ability to be outrageously frank'.¹⁸⁷ The move to Ontario, whilst (and probably because) enticing and exciting for Campbell, unfortunately triggered a noticeable worsening of his bipolar disorder, as recounted by Geoffrey Norman:

He remained manic depressive, hopelessly manic depressive, for his whole life. When he was okay, he was just wonderful. Just an amazing, amazing guy. Funny looking man, what an odd looking man. Crazy as hell. Categorically crazy! But so erudite. I mean, he had a... like every good Oxbridge graduate, he had a turn of phrase that none of us mere mortals could equal. It was just his use of the language was superb... And he gave a surgical rounds – rounds, in the surgery rounds, which we all knew was sort of central in the Health Sciences Building. And he was wonderful, he was superb, he was erudite, he was elegant and all that. But he was in his manic phase. And so when he was all finished, he said: [British Accent] "And if you don't believe what I have to say, you can all just f*** off!" [laughter]¹⁸⁸

So influential was this disease on his life that he chose to write a memoir about the condition, *Not Always on the Level*.¹⁸⁹ Although Campbell was not one of the founding members of the Education Committee, he did contribute significantly to the educational debate, as we shall see later in this treatise. In particular, he had a vocal input into the debate surrounding the role of

¹⁸⁴ Spaulding, *Revitalizing Medical Education*, 20.

¹⁸⁵ Hamilton, in interview with the author, November 12, 2012.

¹⁸⁶ Sackett, in interview with the author, October 25, 2012.

¹⁸⁷ Jack Howell, John Dickinson and John Hamilton, 'Edward James Moran Campbell', *British Medical Journal* 329, no. 7474 (2004), 1105.

¹⁸⁸ Norman, in interview with the author, October 20, 2013.

¹⁸⁹ Edward J. Moran Campbell, *Not always on the level (The Memoir Club Series n°3)* (Place unknown: Amer College of Physicians, 1988).

the tutor in PBL.¹⁹⁰ He also took a strong position in opposition to Howard Barrows' skills-based approach to learning, which we shall expound in Chapter 4 of our treatise.¹⁹¹

From the United States of America, the Founding Fathers brought in two strong-willed individuals who contributed to the Education Committee from late 1968 onward. The first was Barb Mueller, first Chair of Surgery, whom I interviewed just prior to his passing in early 2014. Mueller, it seems (and by his own admission), was a temperamental man who would get into arguments with his colleagues about almost every aspect of the programme – arguments which would often end in his being 'over-ruled' by the EC.¹⁹² Yet, for a surgeon, he displayed a quite peculiar interest in education and agreed to run the 'Saturday morning remedial classes' – a sort of learning group in which students would talk about the content of medicine, but also hit upon certain philosophical subjects, as described by Mueller himself:

One Saturday morning, I decided to talk about truth. Is there any truth? I would say: "How wide is that door?" And I'd say: "You measure it a thousand times, you'd get a thousand different numbers". And you get a bell shaped curve. And you call it the mean, median and mode, and you say that's how wide the door is. What you really wanted to know was: "Can you get a piano through it?"¹⁹³

For a man who had never heard of John Dewey,¹⁹⁴ Mueller's teaching and learning philosophy was remarkably Dewey-like – pragmatic and down-to-earth. The second American of importance in the early days of the programme was Dave Sackett, who contributed both through discussion and memos to the debates in the Education Committee. He was appointed Chair of the soon-to-be-defunct Horizontal Programme – a programme which ran concomitantly to the four phases of the medical curriculum, and whose objective was to sensitize students to the needs of the community and their role as care-givers to human rather than objectified patients.¹⁹⁵ Sackett was also vocal in defining the role of tutors in Problem-based learning¹⁹⁶ and proposing new learning formats to the committee.¹⁹⁷ But his claim to fame remains the development of Evidence Based Medicine.¹⁹⁸

With the cast of character now in place, it becomes easier to understand many of the unfolding events at McMaster, and to place into context much of the archival evidence uncovered in the rest of this thesis.

Role of the Education Committee

¹⁹⁰ See James Kraemer, 'Education Committee Meeting - May 28, 1969'. Minutes from 1969. Educational Programme Committee - 1969 - HHS / FHS Archives, Box 232.5;2. McMaster University, Hamilton, Ontario.

¹⁹¹ See Edward J. Moran Campbell, 'Re: Suggested Goals for Phase IV - Letter to W.J. Walsh, W.B. Spaulding and J.D. Kraemer'. Letter from 1969. Educational Programme Committee - 1969 - HHS / FHS Archives, Box 232.5;2. McMaster University, Hamilton, Ontario.

¹⁹² Mueller, in interview with the author, October 25, 2012.

¹⁹³ Ibid.

¹⁹⁴ He confessed so himself – the only Dewey he was familiar with was Melvil Dewey.

¹⁹⁵ See Horizontal Programme Planning Committee, *Interim Report*. Report from 1968. Educational Programme Committee - 1968 - HHS/ FHS Archives, Box 232.4;6. McMaster University, Hamilton, Ontario.

¹⁹⁶ David L. Sackett, 'Excerpts from the Horizontal Programme Planning Committee Meeting - March 19th, 1969'. Minutes from 1969. Educational Programme Committee - 1969 - HHS/ FHS Archives, Box 232.1;5. McMaster University, Hamilton, Ontario.

¹⁹⁷ David L. Sackett, 'Provisional Curriculum Proposal - Draft II'. Undated draft proposal. Educational Programme Committee - 1968 - HHS/ FHS Archives, Box 232.4;4. McMaster University, Hamilton, Ontario.

¹⁹⁸ David L. Sackett, 'Evidence-based medicine', *Seminars in Perinatology* 21, no. 1 (1997), 3-5.

Analysis of archival evidence, and in particular minutes of Education Committee meetings and memoranda submitted to the EC between 1966 and 1968 gives a rich picture of the EC's role at its inception. The EC, which originally only consisted of Spaulding (as Chairman), Anderson, Mustard and Walsh, and later some of the characters which we described, dealt with almost every aspect of the construction of a framework for the undergraduate MD programme. The following topics featured most prominently in EC discussion, according to the minutes thereof (in alphabetical order): admissions; administrative integration across department; assessment; curriculum design; learning philosophy; learning Resources; nature of biomedical problems; programme objectives; role of the teacher / tutor; specific study format and organization; timetabling. One thing that the EC did not do was to discuss specific learning content. That was left to junior faculty in sub-committees, although EC members occasionally had to arbitrate.¹⁹⁹ But they did so in their qualities as chairs of the various phases rather than members of the EC. Discussion of specific content was never minuted in Kraemer's notes. By 1969, the role of the education committee had crystalized as follows:

Dr. Spaulding outlined four functions with which the Education Committee was involved, namely: 1. Policy - including long-term planning and revision. 2. Immediate operation - including week-by-week contact with the on-going program, feedback, etc. 3. Evaluation - decisions re how, when, who etc. 4. Student / Faculty relations - including representation and activities.²⁰⁰

The next section will give the reader some idea of the ways in which the EC shaped the founding curriculum.

Long-term perspectives

The EC that debated the undergraduate medical programme in late 1969 looked very different to the one that initiated discussions in 1966. From the closed circle of four with which it began, it expanded to include, at the roster of December 3, 1969: Spaulding, Branda, Sweeney, Hamilton, Lewis, Adsett, Anderson, Mustard, Sackett, MacKenzie, Mueller, Walsh, Kraemer. And noted as guests: Maurice, Ross, Emerson, Leader, Storey, Padmos, Frid.²⁰¹ Given that the mission for which the Evans founded the EC – namely, to set up the programme – was now accomplished, and that the new, enlarged shape of the committee did not lend itself to the close-knit sort of discussions that might have prevailed in 1966, it was inevitable that the EC would have to go through some soul-searching to redefine its purpose. The debate seems to have arisen in the summer of 1969, led by Bill Spaulding and Barb Mueller. The minutes of an EC meeting of June 1969 note:

Future role of the education committee: Dr. Spaulding suggested that over the next couple of meetings, the Education Committee should discuss its future role both in relation to the M.D programme and in relation to education in the Faculty of Medicine generally. [...]. In the discussion, there seemed to be some consensus that the Education Committee was concerning itself with different, thought related functions and that perhaps two separate groups of committees should be formed. On the one hand, the need for a group having immediate contact with the M.D. programme was recognized. This education committee would ensure the flexibility and integrated nature of the curriculum and it would also have responsibility

¹⁹⁹ Spaulding, *Revitalizing Medical Education*, 54.

²⁰⁰ James Kraemer, 'Education Committee Meeting - July 9, 1969'. Minutes from 1969. Educational Programme Committee - 1969 - HHS / FHS Archives, Box 232.5;3. McMaster University, Hamilton, Ontario.

²⁰¹ James Kraemer, 'Education Committee Meeting - December 3, 1969'. Minutes from 1969. Educational Programme Committee - 1969 - HHS / FHS Archives, Box 232.5;4. McMaster University, Hamilton, Ontario.

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for maintaining a programme consistent with the objectives of the school. [...]. A second education Committee or council, concerning itself with policies and long-range education programs was proposed. Committee members felt there would be a need for close liaison between these two groups and suggested this might be achieved by periodical joint meetings.²⁰²

It seems that Spaulding recognized the need to release the over-powering grip of the EC over the entire programme, perhaps by sub-dividing its functions into separate committees or councils. Mueller seemed to agree with Spaulding at the following gathering of the EC: too big to be practical, the EC had to be divided, and Mueller suggested a sort of division of powers between 'legislative' and 'executive' arms of decision-making:

Dr. Mustard suggested a current problem was that the immediate demands on committee members conflicted with their long-range prospective for planning and thinking. In connection with Education, he emphasized the importance of this long-range perspective. [...] Dr. Mueller suggested distinguishing between the legislative and executive or operational functions that adhered to educational programs. He felt the existence of a clear distinction along these lines would achieve the functional goals outlined above. [...] After further discussion, committee members seemed to agree there was a need for providing more of the long-range prospective in the committee's activities. It was proposed that the Education Committee should establish a sub-group comprised of people immediately involved in the operation of the program and of people with less of a commitment to it.²⁰³

By the end of 1970, Alec Adsett was Chairman of the EC, and none of the Founding Fathers were regular attendees anymore, as evidenced by the roster on the minutes.²⁰⁴ And so it was that the 'Programme Executive Group' was born to tend to the everyday management of the MD programme, and the original EC was wound down.

Having examined role of the people involved in the founding of McMaster, we will now analyse the structure of the curriculum, from the 1966 when the first ideas on how to organise the programme surfaced, until 1972, when Evans resigned as Dean. We will not be addressing the reforms of the programme into what became the Second Curriculum between 1977 and 1984 as this subject is tackled in chapter 4. The chief points to scrutinize in the structure of the first McMaster curriculum are the systems-based organisation of the curriculum, the nature of small group learning, the structure of problems, the question of whether lectures were used at all or not, the issue of assessment, and the role of community-orientation, in that order.

Structure of the Founding Programme

The structure of McMaster's medical education programme, as it emerged in 1969, differed from any other medical programme of the time, even though it borrowed from many sources of inspiration, as we shall see in chapter 2. There are particular areas in which the programme stood out:

²⁰² James Kraemer, 'Education Committee Meeting - June 25, 1969'. Minutes from 1969. Educational Programme Committee - 1969 - HHS / FHS Archives, Box 232.5;2. McMaster University, Hamilton, Ontario, 2-3.

²⁰³ Kraemer, 'Education Committee Meeting - July 9, 1969'.

²⁰⁴ James Kraemer, 'Undergraduate Education Committee - November 18, 1970'. Minutes from 1970. Educational Programme Committee - 1970 - HHS / FHS Archives, Box 232.5;9. McMaster University, Hamilton, Ontario.

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- The integration of disciplines under the umbrella of a systems approach.
- The use of small groups as the unit of learning.
- The development of problems as the starting point of learning.
- The limited use of lectures.
- The quasi disappearance of assessment.
- The inclusion of a community outlook throughout the programme.

Some of these themes will be developed in great depth and from a comparative standpoint with Maastricht's re-iteration of problem-based learning in Part 2 of this treatise, and with the Aalborg project-work method in Part 3. The objective of this section, therefore, is to give a broad overview of the features of the programme and how these emerged.

A systems-based curriculum

We left off with a description of the context in which the structure of the programme emerged; namely, the Education Committee. It is therefore understood that the programme, as it was rolled out in 1969, was the product of protracted discussions within that arena. Although discussions were going on well into 1969, in fact, Bill Spaulding laid down the quadripartite structure of the three-year programme in his founding memorandum of 1968,²⁰⁵ and little was changed thereafter.²⁰⁶

McMaster Programme Outline (Spaulding, 1968)
Summer course: for those who are lacking in basic scientific knowledge. Consists in behavioural science, biochemistry and cell biology.
Phase I: Normal structure and function - 14 weeks: "The approach will be predominantly regional. For example, as the student learns about the structure and function of the eye, he will also learn how the doctor examines the eye to test the integrity of the organ and its associated controlling structures and mechanisms." (p.5)
Phase II: Abnormal Biological Mechanisms - 6 weeks
Phase III: Abnormal structure and Function - 40 weeks. "This portion of the curriculum is organized by organ systems and includes relevant aspects of abnormal behaviour, ethics, biomedical statistics and rehabilitation medicine." [...] "Each system will be studied by an integration of relevant anatomy, biochemistry, physiology, microbiology, pathology, pharmacology and epidemiology." (p.5) Organ systems: hematopoietic, cardiovascular, respiratory, gastrointestinal, urinary and electrolytes, nervous, loco-motor, endocrine/ reproductive.
Horizontal programme: 1hr per day in Phase I-III
Electives: 2 x 6 week periods after phase III: "In addition, students will be encouraged to approach faculty members with projects which are not in the electives list" (p.6)
Clinical skills: 1 week. Just before the clerkship.
Phase IV: Clerkship - 40 weeks

Table 4: Spaulding's plan for the Medical Curriculum - 1968²⁰⁷

²⁰⁵ William B. Spaulding, 'The Undergraduate Medical Curriculum: McMaster University - Oct 31 1968'. Report from 1968. Objectives of the Faculty School of Medicine - HHS/FHS Archives, Box 145.8;1. McMaster University, Hamilton, Ontario.

²⁰⁶ Evidenced by the fact that Spaulding reported the same structure as laid out here in his retrospect on McMaster of 1991. Spaulding, *Revitalizing Medical Education*, 53.

²⁰⁷ Spaulding, 'The Undergraduate Medical Curriculum', 4.

As we can see, the programme consisted in an optional Summer Course, Phases I through IV, a Horizontal Programme, electives, and a clinical skills course just prior to phase IV (there is no mention of skills training before that). Within a couple of years, the Horizontal Programme was wound down as a separate entity²⁰⁸ – presumably integrated into the rest of the programme – while the summer course was discontinued altogether.²⁰⁹ The rest of the programme, give or take a few units, remained as was until its overhaul in the late 70s.

As we will see in Chapter 2, McMaster did not invent the systems approach used in Phase III but borrowed it from Western Reserve University. However, McMaster's programme was the first to successfully blend basic and clinical sciences through the use of its eight systems-based units of five weeks. This was done by a clever 'matrix' arrangement of both the basic sciences and the clinical components of the organ systems, which were then brought together in the problems, as explained in this excerpt from the education committee:

Selection of curriculum content -- balancing and integrating basic science with clinically important topics: [...] A beginning was made on a matrix arrangement in which along one axis we listed the subdivisions of the basic science subjects and along the other axis listed the clinical subdivisions. The idea is to use the matrix for each system. The clinician breaks down probably in terms of diseases and also indicates their importance judged by frequency, morbidity and mortality. The basic scientist similarly breaks down his subject by systems and indicates the relative importance of each subject in terms of contributions to the basic understanding of disease as well as to the clinical problems.²¹⁰

Although this could be seen as a progressive approach to curriculum planning, it did not come without drawbacks – namely, that there was soon too much material to handle, through all of the phases of the programme. This meant that in practice, the Chairman of any given phase had much arbitration to do.²¹¹

The sequential integrated systems units of Phase III existed as independent entities under coordination of the Phase III Chairman – the first one of which was Bill Spaulding. Each unit was under the responsibility of a unit planner, who would work together on the preparing the curriculum for that unit with a sub-committee. Campbell explained in 1969 that these unit planners and sub-committees had 'been allowed considerable latitude in their detailed approach',²¹² therefore it seems that a determined unit planner would have been quite free to manage his own programme as he saw fit, as long as it followed the general policies of the Education Committee. Kinsey Smith, who planned the first Urinary and Electrolyte Unit, recalls this autonomy with delight:

²⁰⁸ David Sackett, *in correspondence with the author*, April 18, 2013.

²⁰⁹ Mueller, in interview with the author, October 25, 2012.

²¹⁰ Education Programme Committee, 'Report of Educational Programme Committee - Jan 3 1967'. Report from 1967. Educational Programme Committee - 1966-1967, Box 232.4;1. McMaster University, Hamilton, Ontario. 4.

²¹¹ As noted about Jim Anderson and Phase I by Bill Spaulding. Spaulding, *Revitalizing Medical Education*, 54. Also about Bill Spaulding and Phase III by Jim Kraemer. James Kraemer, *in correspondence with the author*, February 12, 2013.

²¹² Edward J. Moran Campbell, 'The McMaster Medical School at Hamilton, Ontario', *The Lancet* 296, no. 7676 (1970), 764.

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It was just marvellous to arrive and somebody say: “we have to have something in the curriculum about your special area”, which is kidneys and electrolytes and so on, so there I was, almost single handed having to devise the curriculum for the first go-around in my area!²¹³

We also saw this in the way that Howard Barrows was able to develop his programmed patients and problem-boxes methods in the Neurology unit. However, it seems that this freedom was not quite as extensive as Campbell suggests, *qua* intervention of Bill Spaulding – as delightfully recounted by Jim Kraemer:

More than a dozen Curriculum Planning Groups or committees were created to focus on the various organ (cardiovascular, gastrointestinal, etc) systems we expected would comprise Phase 3. Their membership mostly included practising physicians from the Hamilton area; there were also some interested academics from the University and a gradually increasing number of the faculty members we were recruiting to the Faculty of Health Sciences. The purpose was to broaden the base of community folk getting involved with the new medical school; to begin getting them to know and work with the academic folk (mixing town & gown); to begin shifting their heads around what the new medical education program was going to be about ~ no anatomy; very few lectures, no labs; a focus on learning v/s teaching; audio-visual learning resources; tutorials; early patient contact & working back from clinical problems to the basic sciences, etc. Ostensibly, these Planning Groups reported to Bill Spaulding who was overseeing the development of Phase 3 (following Anderson [Phase 1] and Mustard [Phase 2] and preceding Walsh [Phase 4/clerkship]). In reality, he led them off and gave them their marching orders; thereafter, it was my job to track and report on their progress and help guide them toward what we were intending. They had a fair amount of time to do their job of determining the content for each Phase 3 organ system unit; meanwhile, our real objective was to ensure their orientation to and engagement in the process of the new program. The committees came up with a variety of schemes ~ one of which was the one day projects (which didn't really go anywhere) Others included encyclopaedic listings of content that even challenged the sub-specialists of the day... It was these Curriculum Development Committees that we urged to turn their lists of content into more precise learning objectives and then went on to having them prepare appropriate learning resources (slide/tape programs ~ the predecessor of PowerPoint presentations. In the end, the first students came onto Phase 3 having been genuine contributors to the program's development; plus the pressures of time and the oversight of the Education Committee prevailed. Meanwhile the bonus was that we had a large number of community physicians who were keen to be involved; pleased not to be responsible for teaching everything that needed to be learned; and, in general supportive, albeit sceptical of what McMaster was intent upon accomplishing.²¹⁴

It seems from this account that the planning proceeded in the form of organized chaos! The result was a tendency towards variation in the interpretation of the EC's will, depending on the unit and the planner involved. Given this, we find some inconsistency in the layout of learning objectives between units, as recalled by Peter Cockshott, founding chair of radiology:

Objectives were originally either made so loose that they didn't mean anything, or else so very specific and tight that they were almost like the index of a book. They were more rigid than what they were supposed to replace. So you would plan an area, then a few weeks later you would realize you had done it all wrong... and would start all over again.²¹⁵

A look at of some unit manuals from all three pre-clinical phases between 1969 and 1971 provides us with a contrasted picture of the structure of objectives.²¹⁶ A Cardiolovascular

²¹³ Smith, in interview with the author, July 10, 2013

²¹⁴ Kraemer, *in correspondence with the author*. February 12, 2013.

²¹⁵ Cited by Spaulding, *Revitalizing Medical Education*, 55.

²¹⁶ David Sackett, 'Re: Phase II - Ischaemia - To: Dr. G.D. Sweeney'. Letter from 1971. Phase II Ischaemia (1969-1970) - HHS/ FHS Archives, Box 242.1;7. McMaster University, Hamilton, Ontario. Unknown. 'Phase III

manual for Phase III does not provide any objectives except to state more generally that ‘the committee has attempted to produce an unstructured programme. Students may elect to work on the various sections of the programme in any order determined jointly with their tutor’.²¹⁷ Regarding Phase II Ischaemia of 1969-70, it seems that Sackett and Sweeney tried very hard to add ‘behavioural objectives’ onto an already set manual: it seems that these objectives were inserted in the manual *post-hoc*. Dickinson also included a dual labelling of his objectives in a 1970 manual for Phases I, II and III Microbiology & Infectious Diseases. First there is a list of overall, educational and intermediate objectives, which are quite general; this is followed on a different page by a more detailed and numbered list of objectives labelled ‘basic instructional objectives’, which definitely follows behavioural approach to objective design.²¹⁸ Although these three manuals are not enough to draw general conclusions from, and we do not have a record of the debates that surrounded the drafting of these manuals, it seems that what Dr. Cockshott observed was accurate: manuals were put together with loose objectives, then attempts were made to introduce detailed behavioural objectives without harmonizing with the existing manual. The result was a confusing mash-up of calls for educational freedom and extremely precise learning goals.

Despite this confusion, which is no doubt by nature associated with pioneering programmes, the systems approach survived and thrived.²¹⁹ But the systems-based approach was not the only distinguishing feature of McMaster’s curriculum. If anything, the small-group, problem-based learning approach is much more vividly associated with PBL than the interdisciplinary block structure. We shall analyse the origins and emergence of the former in the following subsection.

Small-group, problem-based learning

As Dr. Mueller put it: ‘tutorial teaching and problem-based learning became the features most copied by other schools’.²²⁰ The emergence of learning in self-directed small groups, based on biomedical problems, was indeed the key feature of McMaster’s programme – and certainly the feature that earned it the title ‘problem-based learning’ crystallized by Barrows. We shall first look at the origins of small groups before deconstructing the use of problems at McMaster.

Small Groups

Cardiovascular’. Unit Manual from 1970. Phase III Cardiovascular - HHS / FHS Archives, Box 242.1;3. McMaster University, Hamilton, Ontario.

Charles Dickinson, ‘Curriculum’. Course manual from 1970. Microbiology, Infectious Disease, Phase I, II, III, Box 242.1;1. McMaster University, Hamilton, Ontario.

²¹⁷ Unknown. ‘Phase III Cardiovascular’.

²¹⁸ See chapter 2 on behavioural learning objectives.

²¹⁹ The systems approach still exists at McMaster, albeit in a modified format, relying on five sequential ‘foundations’ instead of three pre-clinical phases. Accessed May 20, 2016,

http://fhs.mcmaster.ca/mdprog/description_of_foundations.html

²²⁰ Mueller, ‘McMaster University Medical School’, 30.

There is no clear reference to the provenance of small groups. However, they were a clear feature of the programme from the beginning. Dr. Norman suggests that the inspiration for groups might have been from the Oxbridge tutorial setting:

It remains a mystery why they latched onto the small group tutorial. ... Basically, one idea is that in the 60s, we did everything in small groups. [laughter] *Everything!!* [laughter]. That's of course reconstruction after the fact. ... Canada, is, by its nature, stuck in the middle of the Atlantic between the UK and the US. And we have parts of both. We sound like Americans but we think like Brits... So we really are stuck in the middle of the Atlantic, psychologically. And I think we were trying to emulate the Oxbridge model.²²¹

This theory was also put forward by Dr. Mueller in 2008, who stated that 'the 'tutorial' was adapted from the English tutorial systems of Oxford and Cambridge'.²²² It should be noted that the Oxbridge tutorial was a one-on-one relationship, not a small group exercise, so even if it was an inspiration, it would have to have been adapted from its original British format. We shall return to Oxbridge's influence on the programme in Chapter 2 – but whilst this is a likely hypothesis, it could also be a story that has been floating around and reconstructed *a posteriori*. We do have references to the importance of small groups in the EC's thinking from 1968, as transcribed by Jim Kraemer:

It was suggested that an education programme oriented to learning seemed to favour a permissive learning programme in which the student had contact with his tutor only for assessment. However, in this extreme case, students would lose the value of group dynamics and stimulation to learning. In the end, their learning experience would be quite narrow. There was agreement that the learning should focus on a small group of students²²³

By this account, it seems that small group learning was favoured because of its propensity to stimulate learning through group dynamics. Although there was no talk of 'motivation', as is so popular in educational parlance today. The theme of group dynamics was picked up on by Barrows and Neufeld in their landmark 1974 article:

The small-group tutorial represents a laboratory of learning about human interaction where a student can develop interpersonal skills and become aware of his own emotional reactions. It is an opportunity to learn how to listen, to receive criticism, and in turn to offer constructive criticism. It is a forum for group problem-solving, where the pooled resources of the group members, in terms of academic training, experience, personality, and perspective are more effective than the sum of individual abilities. A small-group tutorial provides an opportunity for self-evaluation by which a student can compare informally his own learning progress with that of his peers. The small-group tutorial setting also facilitates the processes of peer evaluation.²²⁴

Barrows and Neufeld focus here on a number of 'skills' that students might acquire in the process of working in small groups, all of which would tend to make them better learners and colleagues. However, it must be noted that this article was published in 1974, and thus long after the decision was made to have small groups, and neither author was involved in the original decision. This may thus be a post-hoc interpretation in pedagogical terms that suited the world-view of the authors at the time of writing without necessarily representing the true origins small groups at McMaster.

²²¹ Norman, in interview with the author, October 20, 2013.

²²² Mueller, 'McMaster University Medical School', 30.

²²³ Kraemer, 'Education Committee Meeting - September 6, 1968'.

²²⁴ Neufeld and Barrows, 'The "McMaster Philosophy"', 1044.

Whether small groups were British-inspired, learning-driven or purely circumstantial, the fact is that the learning set-up of a small group of four students accompanied by a tutor was a basic feature of McMaster's programme from the beginning. This was presented to the Council of the Faculty of Medicine just prior to the opening of the first year as a *fait-accompli*:

The class is divided into groups of four students, with one Faculty tutor assigned to each group. Students have different tutors in each phase or section of the program. The tutor participates in planning that particular part of the curriculum and has an adequate background in the subjects relating to it. He is not necessarily and expert in the field.²²⁵

Small group work is still a *sine qua non* condition of any PBL programme today, although the number of students allocated to a group varies. There is probably no modern PBL programme which still uses four students per group, least of which McMaster, and one might conjecture that this is principally a question of financial realism.²²⁶ The norm, from first-hand contact with over 25 PBL programmes around the world, seems to be between 6 and 15 students. But PBL is not just about small groups, it is also contingent on the use of problems as the starting point of the learning.

Problems

Like small-groups, the problem-based format was decided upon from the start. Unlike the issue of small groups, we know that it was John Evans himself that championed the idea of biomedical problems in his founding memorandum of 1966:

The medical sciences option will deal specifically with problems of human biology emphasizing an integrated approach to normal structure and function and the basic tissue and system reactions which lead to abnormal structure and function. In conventional programmes, most of this information would be presented in courses of Anatomy, Physiology and General Pathology.²²⁷

Bill Spaulding picked up the theme of biomedical problems as soon as serious planning began with the EC. He was adamant that Evans' ideas should be interpreted as calling for a problem-based format from day one of the curriculum. In his memorandum of 1968, Spaulding stressed that contact with patients and problems should start from the first week of the academic programme:

The students will be introduced to patients and their problems during the first weeks of the first year of the course. It is hoped that students, stimulated by this experience, will see the relevance of what they are learning to their future responsibilities, will maintain a high degree of motivation and will begin to understand the importance of responsible professional attitudes.²²⁸

It is interesting that he calls upon student motivation to justify his stance – a position that was mostly floating around behaviourist drive research such as that of Daniel Berlyne, but was not

²²⁵ Ad Hoc Committee On Undergraduate Education 'Summary of Report of the Ad Hoc Committee on Undergraduate Education - Presented to the Council of the Faculty of Medicine, September 24, 1969'. Report from 1969. Educational Programme Committee - 1969 - HHS / FHS Archives, Box 232.5;5. McMaster University, Hamilton, Ontario.

²²⁶ The website currently mentions groups of 10: http://fhs.mcmaster.ca/mdprog/education_methods.html

²²⁷ John Evans. *Academic Programme in Medicine - March 1966*. Memorandum from 1966. Objectives of the Faculty School of Medicine - HHS/FHS Archives, Box 145.8;1. McMaster University, Hamilton, Ontario.

²²⁸ Spaulding, 'The Undergraduate Medical Curriculum', 3.

so prevalent in education.²²⁹ But as we know, Spaulding was an avid reader of unusual educational inspiration sources. However, Spaulding's enthusiasm for the use of problems was received with some confusion by the plethora of sub-committees under the aegis of the Education Committee, as shown by letter from Jim Kraemer to the Education Committee, aptly entitled 'the problem-solving problem':

Some of our curriculum planning groups have been giving considerable thought to the method of learning (teaching) that would be employed throughout their part of the programme. While they are aware of the model proposed by the education committee, namely that of a compromised tutorial system within a problem-solving framework, they seem to be having some difficulty in applying this model to their respective programmes.²³⁰

This problem-solving problem was taken seriously by the EC, resulting in further chaos and confusion:

Problem-Solving Problem. The committee considered Mr. Kraemer's memorandum of July 26, 1968... There was less agreement as the committee discussed the various learning methods being suggested by Phase III groups. The main question was whether or not the Education Committee ought to make clear its views on learning and then intervene wherever a planning group appeared to be departing from those guidelines. The main difficulty was that committee members differed in their views on learning methods. In the end, it was noted that in time, the pressures of students and other faculty opinion on this matter will probably solve the question.²³¹

The last sentence in these minutes was likely a clever subterfuge to avoid making any decisions and hope that somehow things would work themselves out. In the resounding words of Dr. Fraser Mustard, the solution was often quite simple indeed: 'eventually you just have to take over and simply put it into place and get your people to do the jobs and to hell with democracy!'²³²

And so decisions on problems fell into place, eventually, as the opening of 1969 was drawing near: students would begin their undergraduate medical career with patient problems. This was interpreted by Dr. Alan McNabb, in a letter to Bill Spaulding, as a fairly loose way of organizing study around this mystical idea of 'problem-solving':

The students, in groups of four, will be assigned topics or problems of their choice in regard to the patient and the topic of hyperthyroidism with which they must become conversant. [...]. This method will give the student the stimulus of a live patient and her problems. Then it becomes the responsibility of the student to learn on his own and solve these problems as he sees them.²³³

The letter goes on to list the resources put at the disposal of the students: detailed sets of notes, key articles (to be included with notes), a pertinent bibliography, plastic embedded dissections, micro-slides... The idea seems to have been: give them all of the resources and let them sort

²²⁹ Daniel Berlyne, *Conflict, arousal, and curiosity* (New York, NY: McGraw-Hill Book 1960).

²³⁰ James Kraemer, 'Re: The Problem-Solving Problem'. Memorandum from July 1968. Education Committee Minutes - July-Sept 1968 - HHS / FHS Archives, Box 232.4;6. McMaster University, Hamilton, Ontario

²³¹ James Kraemer, 'Education Committee Meeting - August 30, 1968'. Minutes from 1968. Educational Programme Committee - 1968 - HHS/ FHS Archives, Box 232.4;6. McMaster University, Hamilton, Ontario.

²³² Cited by Spaulding, *Revitalizing Medical Education*, 60.

²³³ Alan McNabb, 'To: W.B. Spaulding, M.D. Re: Phase III Curriculum'. Letter from 1969. Educational Programme Committee - 1969 - HHS / FHS Archives, Box 232.5;2. McMaster University, Hamilton, Ontario.

things out. But this begs the question: were the students assisted by lectures or not in this process?

To Lecture or not to lecture?

The question of study time allocation at McMaster is an important one, because recent publications have proposed that a 'pure' Problem-based learning model only consists of the classic small-group tutorial, and schools that adds lectures or seminars to their PBL curriculum are to be considered as a hybrid variation of the 'pure' PBL model.²³⁴ Indeed, without partaking in the hybrid *versus* pure PBL debate, Schmidt has asserted for some time now that limiting the amount of lectures is a key component of Problem-based learning.²³⁵ But was the entire McMaster curriculum really solely based on tutorial group work and self-study? And if not, what proportion of the time was allocated to which means of teaching and learning?

The response is unfortunately not so readily available, owing in part to the very nature of McMaster's programme, which was reluctant to impose any means of learning to tutors and students alike, as evidenced by this excerpt from the minutes of an EC meeting in 1968:

A further suggestion was that curriculum planners should concentrate on determining instructional objectives (methods of assessment) and on developing learning resources. In implementing an education programme developed in this way, the respective groups of students, with their tutor, would decide how to learn a given subject. In this situation, a manual of possible learning methods might be developed and made available to students and faculty.²³⁶

It seems that whilst the tutorial group was the heart of the learning process, the structured PBL tutorial as we imagine it today was a lot more loosely defined in the early days of McMaster. The origins of McMaster's study-time allocation date from 1967, when Jim Anderson attended a conference marking the 80th session of the American Association of Anatomists, from which he retrieved a pedagogical paper authored by Dr. John Franklin Huber. He presented this paper to the Education Committee in April 1967, noting particularly the passages in which Huber referred to study time and format:

I would like to call your attention to the results of a study done some time ago, under the auspices of the National Education Association, which showed that 40% of learning can be done in "large group instruction", 20% in "small group discussion" and 40% in "independent study". [...] Large Group Presentation: This name has a much broader connotation than "lecture" and should, I believe, replace "lecture", a procedure which has fallen into disrepute for many educators. [...] In regard to things we all have been doing over the years, laboratories are primarily self-instructional areas and the usual books and journals are self-instructional materials. [...] It is my belief that self-study will become increasingly important in our medical school and in continuing medical education. We must develop this habit in our medical students and make learning materials available to our physicians to keep them up to date.²³⁷

²³⁴ See for instance : Chiu Yin Kwan, and Leslie Tam, 'Hybrid PBL-What is in a Name?' *Journal Of Medical Education* 13, no. 3 (2009), 76-82.

²³⁵ Henk Schmidt et al., 'Constructivist, problem-based learning does work: A meta-analysis of curricular comparisons involving a single medical school', *Educational Psychologist* 44, no. 4 (2009), 227-249.

²³⁶ Kraemer, 'Education Committee Meeting - September 6, 1968'.

²³⁷ John F. Huber, 'Communication Media in the Modern Presentation of Anatomy', Symposium paper from 1967. Educational Programme Committee - 1966-1967 - HHS/ FHS Archives, Box 232.4;2. McMaster University, Hamilton, Ontario.

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The presentation of this paper to the EC does suggest that Anderson might have been enjoining his colleagues to see a trend in the reduction of large group instruction in medical education at the time. It is interesting to note that only 20% of instruction was deemed small-group worthy in Huber's address. It is equally interesting to note the large proportion of time advised for self-study, as this is according to Schmidt one of the most crucial aspects of PBL.²³⁸

This discussion led to the formulation of a list of seven teaching and learning methods that could be used by all and any unit planner in whichever order or importance was deemed necessary for the subject:

4. Methods: Seven teaching and learning methods are available. For each study unit, the most effective combination of these methods is determined.

4.1: Guided Instruction: - Large group technique. - used as introduction to an area or a mass-produced remedy to common problems - NOT a lecture - Most effective when brief, intermittent and unscheduled.

...

4.2 Developmental Discussion: - may be large or small group - used to begin a new topic by building on past knowledge or as a method to organize and summarize the content of a learning unit which has just been studied - all information comes from the student, not the tutor. The role of the tutor is to provide the questions that initiate new chains of information. ...

4.3: Tutorial: - 4 students and a tutor - unstructured - progress reports, guidance, morale building, inciting panic as needed - mainly to support and nourish the day-to-day operations of the four student group. ...

4.4 Field trip: A group of 4 students, a guide, a goal and a target area. ...

4.5: Self-Learning: provision of a learning goal and adequate facilities to achieve it. ...

4.6: Lecture: - Large group - reserved for a few important occasions a) a useful visitor who has much to offer but no other method of communication b) the presentation of organized information in concise form on a complex subject. Time saving is the goal. c) a change of pace when other techniques are wearing thin.

...

4.7. Recitations: - a tutor and a group of four students. - These are essentially evaluation sessions - Evaluation of a) each student's progress b) the success of the mode of presentation. - Should occur at the end of each learning unit. - Tutor explores with the group the success each student has had in understanding the material presented. - Evaluation (satisfactory or not satisfactory) is done openly and recorded with one copy for the student and one for the teaching staff. ...²³⁹

This list, drawn up by the Education Committee in March 1968, offers strong evidence that many alternatives to the tutorial were being considered at the highest levels of the EC, in the spirit of students' freedom to choose their own learning path outlined above. The composition of the list itself is interesting: two of the teaching techniques effectively represent what we would call lectures. The 'tutorial' as noted here is more akin to a mentoring session, whereas the 'developmental discussion' is in fact what we would call a tutorial given the modern understanding of PBL. Nomenclature aside, this list reveals a certain pragmatism on part of Spaulding and co. who, at this stage, were not so set in their thinking as to impose one single method of tackling problems. It was, however, clear that the EC did not favour top-down approaches to education – and Spaulding sent out some of his famous 'marching orders' to that effect: 'Less than one-third of the time of a student should be spent in a pre-determined

²³⁸ Esther Chng, Elaine H.J. Yew, and Henk G. Schmidt, 'Effects of Tutor-Related Behaviours on the Process of Problem-Based Learning', *Advances in Health Sciences Education* 16, no. 4 (2011): 495.

²³⁹ Education Programme Committee. 'Phase I Programme: 1969'. Memorandum from 1968. Educational Programme Committee - 1966-1967 - HHS/ FHS Archives, Box 232.4;1. McMaster University, Hamilton, Ontario, 3-4.

confrontation with his tutor The tutor is to be available at the end of the day for informal consultation'.²⁴⁰ In that sense, Huber's premonition regarding the importance of self-study appears to have materialized. However, contrarily to Huber's expectations, Spaulding clearly opposed the idea that 40% of the time should be dedicated to lecture-type exercises, as he wrote in the same document, with inescapable definitude: 'No lectures except to orientate and inspire'.²⁴¹

This progressive viewpoint had its detractors both within and outside of McMaster - the old ways still had their supporters. And thus John Evans received a letter from a colleague at McGill University in February 1968, in which the latter expressed a measure of doubt towards the tutorial method, enjoining Evans to consider the use of lectures:

I wonder whether you might not achieve more in your early years of actual operation by retreating in some areas to a more lecture-oriented program. ... For example, when the word spreads that Dr. Mustard can give a superb and concise account of say the pathophysiology of thrombus formation, every student will want the privilege of hearing this, and one informal lecture to 64 students is preferable to 16 sessions with 4 students in any situation where time is a factor.²⁴²

And yet, ironically, as 'superb and concise' as his lectures might be, Mustard appears to have defended the tutorial method by raising concerns with the EC regarding the 'dogma approach':

Dr. Mustard saw the Faculty's experience with the 'dogma' approach to learning as being critical to the problem for the programme. In this connection, Dr. Spaulding asked what would happen when the students met more traditional faculty members in Phase III. Dr. Mustard hoped that the students would appreciate the difficulties and differences in faculty members by this point. Dr. Barrows stated there should be no 'dogma' approach in any part of the M.D. Programme.²⁴³

Barrows' anti-dogmatic assertion was not enough to reassure the EC, who sought material ways to imbue potentially reluctant Phase III Faculty members with the values and approaches of McMaster. The solution they came with was to immerse those Faculty members in the programme during its early phases, such that when it was their turn to run the show, they would be quite familiar with the desired methods:

It was proposed that the Phase III Faculty members should be involved as much as possible in the planning and presentation of Phase I and II. In this way, they would have some experience with the less traditional methods of learning and also, they would know exactly what material had been covered in these early parts of the programme.²⁴⁴

It seems that these efforts paid off and indeed, at least for the first few years, Spaulding, Mustard and Anderson's view of study-time allocation prevailed. The Ad Hoc Committee on Undergraduate Education, reviewing the programme in 1969, reported: 'there are few formal sessions. The students' time is largely unstructured, which permits students to proceed at their

²⁴⁰ William Spaulding, 'Guide for Planners - March 1, 1968'. Submission from 1968. Educational Programme Committee - 1968 - HHS/ FHS Archives, Box 232.4;4. McMaster University, Hamilton, Ontario.

²⁴¹ Ibid.

²⁴² J. Bliss, 'Letter to Dr. John R. Evans - February 28, 1968'. Letter from 1968. Educational Programme Committee - 1968 - HHS/ FHS Archives, Box 232.4;4. McMaster University, Hamilton, Ontario.

²⁴³ James Kraemer, 'Education Committee Meeting - May 28, 1969'. Minutes from 1969. Educational Programme Committee - 1969 - HHS / FHS Archives, Box 232.5;2. McMaster University, Hamilton, Ontario.

²⁴⁴ Kraemer, 'Education Committee Meeting - May 2, 1969'.

own pace. ... It is expected that students will meet with their tutors frequently, probably at least once a day'.²⁴⁵

We do not have black and white evidence of what a typical McMaster student's week might have looked like. The answer is probably that there was no 'typical student's week', given that students could arrange tutorials at their own convenience, attend lectures as they pleased (or not), organize their own study trips and self-study to their heart's content. Thus, it would be an inaccurate depiction of McMaster's earliest curriculum to propose some sort of static 'timetable'. Study time allocation is best understood as a flux – depending on the student, the subject, his group-mates, the availability of tutors and a host of other elements.

With all of this said, we do have some witness accounts of what this might have looked like. Former student Arthur Leader explained:

There were no exams, no lectures, they had these slide tape carousels, they were synchronised. So we never got lectures on them, but what we had is we had these working groups. You were assigned a tutor and the other thing that you had is that you were assigned to a family physician and you had to work... I think you had to go work one either evening or, I think it was one evening a week as a minimum, and you could do more if you wanted if they had more evening hours.²⁴⁶

But the most developed depiction that we have of student time allocation comes from Jim Anderson, who, in his usual wry style, penned the imaginary week of a student in the 'G.I. system'.²⁴⁷ The diary included gems such as:

TUESDAY

8.30. Group met in MD Lab and looked at slides. "It all comes back to me now". Wish we had grabbed some EM pictures. Path slide: when you've seen one fibrocyte you've seen them all. Looked at gross specimen of cirrhotic liver. Yuk. (Why Laennec's cirrhosis? Who was Laennec?) Bill (master of the snow job) mumbled "Just like the findings in Banti's Disease." Did not give him the satisfaction of asking. (Look up in Med dictionary).²⁴⁸

The diary gives the impression of a very ad hoc learning process in which the group of four students, driven by endless curiosity and thirst for knowledge, engage in a treasure-hunt style quest for medical problem-solving that leads them to the lab, to the library, to their tutor meetings and to late-night group meetings in their dorm rooms in no particular order and with seemingly no structure.

On the question of assessment

²⁴⁵ Ad Hoc Committee On Undergraduate Education, 'Summary of Report'.

²⁴⁶ Leader, in interview with the author, by telephone, October 19, 2012.

²⁴⁷ James Anderson, 'A week on the G.I. system, a mythical log of John Smith on his second week of systems teaching', cited by William Spaulding in his report 'Objectives and Outline of the Undergraduate Educational Programme' from March 1967. Educational Programme Committee – 1966-67 - HHS/ FHS Archives, Box 232.4;1. McMaster University, Hamilton, Ontario. Although the original text does not state that it was written by Anderson, an Spaulding indicated that Anderson had written it in his account of 1991.

²⁴⁸ Ibid, g-12.

One thing is very clear about McMaster's assessment policy in its formative years: there were no formal examinations, only formative evaluations on a satisfactory/ unsatisfactory basis done by the group's tutor. Dr. Mueller explained:

In the absence of formal examinations, evaluation of student performance was done by the tutor who was expected to know how much each student knew, his/her ability to use the library, manner of learning and interpersonal reactions. This obligated a change in traditional faculty/student attitudes for it required tutors to participate and partner in student learning, as well as evaluate and judge how much was learned. This dual "partner and evaluator" role proved impossible.²⁴⁹

Dave Sackett proposed some reasons as to why this policy might have been adopted:

We thought formal evaluation was stupid and the ... perhaps brightest guy at the medical school – a chap named Moran Campbell, was Chair of Medicine, just an incredible intellect – said that as far as he was concerned, the success of the programme would be demonstrated if all of our students flunked the Canada Council License – which are the nation-wide exam at the end of medical school.²⁵⁰

The paradox of McMaster's evaluation system, as outlined here, is of course that at the end of three years of idealistic assessment-free freedom to learn, students were confronted with the same fact-based, traditional Medical License exam (known as the LMCC) as the rest of Canada. Dr. Norman remarked on this paradox in his own interview, by noting that the policy was maintained until 1989, but then reversed in the face of increasing failure rates at the LMCC.²⁵¹

But the same basic idea of a tutor guiding the students' learning as opposed to telling the students what they need to know. All of that, the fact that they didn't have any examinations until that became a necessity as part of the: "oh hell, our failure rate is five times the national average in 1989! We'd better do something". ... So I think what they were really on about was basically making it more humane. They adapted aspects of the British system, they adapted aspects of the American system, they vetoed examinations, because that encouraged factoids.²⁵²

But the 'veto' of formal examination methods was not as straight-cut or easily imposed as Sackett or Norman might make it sound *a posteriori*. Archival evidence suggests quite a battle for the soul of assessment at McMaster. While it is true that the EC started with the postulate that assessment should reflect its learning philosophy: 'The Committee took the view that a student's attention should be focused on his progress through the medical programme, and that any method of assessment interfering with this objective should be avoided',²⁵³ it was not said in this instance what would interfere and what would not.

Spaulding tentatively opened the debate with an open suggestion to put together a sort of 'comprehensive' assessment system that would promote the education objectives of the institution – leaving it up to the faculty group to determine how:

The following proposals are made for consideration of the Committee: 1. Comprehensive examinations should be stressed and examinations which are confined to one academic discipline should be avoided. 2.

²⁴⁹ Mueller, 'McMaster University Medical School', 30.

²⁵⁰ Sackett, in interview with the author, by telephone, October 25, 2012.

²⁵¹ Geoffrey Norman, et al. 'Assessment steers learning down the right road: Impact of progress testing on licensing examination performance.' *Medical Teacher* 32, no. 6 (2010): 496–499.

²⁵² Norman, in interview with the author, at McMaster University, October 20, 2013

²⁵³ Kraemer, 'Education Committee Meeting - April 8, 1968'.

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Examinations would be graded but not marked ... 3. Each phase or system faculty group would decide how best to use examinations to promote educational objectives.²⁵⁴

Opposing him, Anderson placed the first nail in the coffin of formal examinations by suggesting the use of the tutorial as an appropriate setting for assessment. Given what we know of his character, we might attribute this to an *élan* of idealism (in the optimistic sense):

Somewhere in our statements of policy, we should remind ourselves that the tutorial system provides a readymade framework for evaluation. If we don't, there is a danger that we will be operating two mutually incompatible systems: learning methods that are not traditional, but examining methods that are.²⁵⁵

To support his position, Spaulding put together a systematic table of possible examination methods, submitted to the Education Committee, in May 1969:

Learning Methods and Evaluation	
(Learning Methods) Questions:	(Evaluation) Questions:
Student selection vs. staff prescription Unscheduled vs. scheduled Unsupervised vs. supervised Individual vs. group	Impressionistic vs. detailed, defined minimum Pass-fail vs. detailed grades Sporadic vs. regular Student or faculty initiated vs. prescribed by education committee (note: these last words added in ink pen) Anecdotal vs. formal test Performance vs. information
(Learning Methods) Modes:	(Evaluation) Modes:
Reading Looking Discussing Hearing Copying Drawing Writing (creative) Handling Examining patients Doing lab work Working out set problems	Essay Multiple-choice Quiz Simulation (performance) Casual observation Clinical performance Teaching (seminar, rounds)

Table 5: Spaulding's Learning Methods and Evaluation - May 1968²⁵⁶

In this table, 'questions' indicates the choices that the EC had to make about the kinds of learning and assessment they were going to give the students. The 'modes' refer to the means through which this might be carried out. This table, which is copied straight out of the memorandum from Spaulding, shows that he was not excluding more formal assessment formats, such as quizzes, multiple-choice questions and essays.

²⁵⁴ William Spaulding, 'Re: Policy Concerning Examinations - To: Members of the Education Committee - April 18, 1968'. Memorandum from 1968. Education Committee Minutes - April-June 1968 - HHS / FHS Archives, Box 232.4;5. McMaster University, Hamilton, Ontario.

²⁵⁵ James Anderson, 'Re: Policy Concerning Examination - To: W.B. Spaulding - April 25, 1968 - Used during E.C. Meeting of Dec. 3, 1969'. Letter from 1968. Educational Programme Committee - 1969 - HHS/ FHS Archives, Box 232.5;4. McMaster University, Hamilton, Ontario.

²⁵⁶ Reported by Jim Kraemer: Kraemer, 'Education Committee Meeting - May 2, 1969'.

Both Spaulding and Anderson's letters, although penned in 1968, were re-used in an EC meeting of December 3, 1969: we can therefore conclude that both propositions were still on the table and no agreement had been by early December of the first year of the programme. Jim Kraemer noted the outcome of the December 3 meeting:

Also, a number of reservations were expressed as to whether an evaluation system could be implemented to assess performance in problem-solving situations. There was broad agreement that some form of evaluation was crucial and unavoidable but there was a lack of definition as to what form that evaluation should take.²⁵⁷

On December 15, Bill Walsh intervened in the debate to propose a compromise between the position of Spaulding and Anderson, in which both tutorial formative assessment and end-of-phase examination (it is not clear whether summative or formative) would co-exist in the programme:

There will be no ranking, which would serve no useful purpose and has many detrimental side effects. Further, there is no pass or fail system but rather the evaluation is to identify problems in students, faculty, and the educational system. [...] In entering each Phase or sub-section, there should be a pre-test so that the faculty and students are aware of the skill, knowledge and attitudes of each student on entering that particular portion of the curriculum. [...] In addition, there should be ongoing assessment or evaluation of the students by the tutors as they go through week by week with early feedback to the students to augment their learning process. [...] Finally, at the end of each curriculum Phase or Sub-section, there should be an evaluation to see if the student has reached his objective.²⁵⁸

It seems, though, that by December 30th, Anderson had the last word on assessment as evidenced by a report in which his final recommendation echoes McMaster's policies, as reported by Dr. Mueller earlier: 'Recommendations: A. Evaluation should be done on the basis of a small group in which there is a personal bond between a tutor and a student who together share responsibility for attaining goals'.²⁵⁹ This report was the final nail in the coffin, and so, McMaster's assessment fate was sealed until the collapse of Anderson's idealist system in the face of the realism of LMCC failure rates in 1989.

Romantic idealism about the role of education in self-development wasn't confined to the abolishing of examinations. In the early years of the debate about the MD programme, a commitment was made to community-orientation, in a bid to engage medical students in the concerns of society.

Community-orientation

The ideal of community-orientation was very much present in the early years of EC discussions, and present in Spaulding's first outline of the undergraduate medical programme under the description: '*To foster attitudes leading to behaviour as responsible physicians and*

²⁵⁷ Kraemer, 'Education Committee Meeting - December 3, 1969'.

²⁵⁸ William Walsh, 'Re: Evaluation - To: Education Committee - December 15, 1969'. Memorandum from 1969. Educational Programme Committee - 1969 - HHS / FHS Archives, Box 232.5;4. McMaster University, Hamilton, Ontario.

²⁵⁹ James Anderson, '7. Evaluation - To: Members of the Education Committee - December 30, 1969'. Report from 1969. Educational Programme Committee - 1969 - HHS / FHS Archives, Box 232.5;4. McMaster University, Hamilton, Ontario.

scientists in their relation to patients, colleagues and society'.²⁶⁰ This ideal was embodied in the 'Horizontal Programme', a plan to pair up students and family physicians from the community of Hamilton to give the former an idea of the challenges facing the latter, as an on-going programme to run in parallel to the regular medical studies. The EC assigned the role of drawing up the plans for this programme to Dave Sackett, who produced his first interim report in 1968.

Excerpts from the Horizontal Programme Interim Report from 1968

A. Societal Goals: The second of two objectives of the McMaster Medical Curriculum read as follows: "To foster attitudes leading to behaviour as responsible physicians and scientists in their relation to patients, colleagues and society" [...] We regard this as the perception, on the part of the Faculty of Medicine, of a goal established not by the University but by society. This goal constitutes the basis for the establishment of the Horizontal Programme.²⁶¹

In order to translate the educational goals into instructional objectives, we proceeded through the step of establishing intermediate goals [...] 1. to develop physicians who see themselves as but a single member of a large group of individuals who are bound together by their commitment to health [...] 2. to develop a physician who views any level of health status as worthy of receiving personal health services [...] 3. To develop a physician who views behavioural and social factors as powerful determinants of disease outcome which require identification and intervention. [...] To develop a physician who views himself as a member of the total community, responsive to its needs for both his special and ordinary contributions [...].

IV Instructional Methods: The horizontal programme is primarily concerned with attitudes; that is, the development of mental dispositions to behave in certain fashions. It is suggested that attitudes have their bases in feelings, emotions, prior experience and societal norms as well as in cognitive knowledge. The members of the Committee feel that attitudes cannot, therefore, be 'taught' in the usual sense of the word. Rather, a teacher must rely upon his own behaviour as a 'role model'

Achievement of the educational objectives with respect to attitudes would be achieved through the close association of the student with a faculty preceptor who would, as a 'role model', exemplify those attitudes which are indicated in the ultimate goals of the programme.

Table 6: Goals of the Horizontal Programme according to Dave Sackett from the Interim Report of 1968

However noble the ideals proposed in the Horizontal Programme, it was not able to survive the harsh reality of curriculum planning and management. Already in November 1968, problems were appearing with the planning:

Dr. Barrows pointed out that in facing the Horizontal Committee's report, the Education Committee had presented a mosaic of response. While it had dealt with many of the issues before, it had not finished this exercise and was thus unable to give the Horizontal Programme Committee the direction it was seeking. There was agreement that a more conclusive position would have to be reached before the Education Committee would be able to evaluate the proposals of other curriculum planning groups.²⁶²

By 1970, it was agreed that the Horizontal Programme was 'hopelessly complicated' and whatever content could be salvaged from it was included instead in the main body of the medical curriculum.²⁶³ Despite the failure of its own attempt at making a special case of community-orientation, McMaster University continued to preach the value of PBL for community-orientation in universities and medical schools across the developing World, particularly in Africa and South East Asia. They remained a member of the Network of

²⁶⁰ Spaulding, 'The Undergraduate Medical Curriculum', 3-4.

²⁶¹ Horizontal Programme Planning Committee, 'Interim Report'. Report from 1968. Educational Programme Committee - 1968 - HHS/ FHS Archives, Box 232.4;7. McMaster University, Hamilton, Ontario.

²⁶² Kraemer, 'Education Committee Meeting - November 1, 1968'.

²⁶³ Unknown, 'Phase I: 1970, Guidelines to Operating the Programme'. Report from 1970. Educational Programme Committee - 1970 - HHS/ FHS Archives, Box 232.5;8. McMaster University, Hamilton, Ontario.

Community-Oriented Educational Institutions for the Health Sciences, established in 1979 under the auspices of the World Health Organization, for several decades.²⁶⁴

Conclusion

When Harry Thode named John Evans as his Founding Dean of the new McMaster School of Medicine, he knew that he would get something new and unusual, he just didn't know what. Beyond the bullet-point principles of his founding memorandum of 1966, it wasn't Evans who 'invented' problem-based learning, but the team he assembled in the Education Committee of the new school – his friends Jim Anderson, Fraser Mustard, Bill Spaulding, and Bill Walsh. It was these people who inspired the likes of Barrows and Neufeld to theorize and spread PBL throughout the World, which has often led people to mistakenly believe that the PBL was the latter's creation. Yet the principles of PBL were laid down long ere Barrows and Neufeld were involved. These principles were divided into core educational ideas: a systems-based approach to the curriculum structure, a small-group, problem-based approach to the learning, and a community orientation to student attitude training. But these ideas, revolutionary as they were, must have come from somewhere, must have been a re-iteration of some erstwhile notions and practices of education. In the next chapter, we will hunt down the intellectual influences both philosophical and practical that drove the innovations at McMaster. We will begin by looking at the founding documents of McMaster and deconstructing their content in terms of their intellectual origins. Then, we will look at explicit and tacit sources of philosophical inspiration for the Founding Fathers by linking the use of these sources in archive materials to the original texts of the philosophers and thinkers in question. Finally, we will consider the sources of inspiration that came from practice, namely the Harvard Case Method, Western Reserve University and the Oxbridge tutorial system.

²⁶⁴ Henk G. Schmidt, et al, 'Network of Community-Oriented Educational Institutions for the Health Sciences for the Health Sciences', *Academic Medicine* 66, no. 5 (1991): 259–263.

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To speak of one unified McMaster Philosophy would be like attributing a predictable pattern to the waves crashing on a shoreline. As waves ebb and flow with the movement of the tides and the strength of the wind, so McMaster's philosophy moved and adapted over the years with time and the varying personalities that shaped it. What is left for historians to see are the markings in the sand – the traces of erosion left behind by cumulative re-iterations of these thoughts and ideas. And so in this particular section, we dig down to the deepest layer and turn to the very origins of McMaster's problem-based programme. As we have seen, there are three foundational documents that account for the general direction in which McMaster's programme constructed itself in its earliest years – and these need to be examined more thoroughly. But beyond the documents and their authors, serious thought needs to be given to the intellectual and historical context in which these documents were produced. This means looking for the imprint of great minds in medical education and education more generally in the work of the Founding Fathers. In this task, there is no guarantee that there is such an imprint to be found. It also means searching for the burgeoning precedent or concomitant educational experiments in North America and Europe that, while unsuccessful or only partly successful, might have pushed McMaster's pioneers to experiment and succeed. Finally, it begs the necessity to grasp the context of North American education in the 1960s as a whole and determine whether McMaster came as a unique product of its time, or a repeatable timeless experiment.

Searching for the Origins of the Founding Documents

Our journey into the intellectual history of McMaster's PBL programme begins with an analysis of the three core documents that set the programme up, namely the letter that Harry Thode penned in 1963 to express his desires for the new school, Evans' founding memorandum of 1966, and Spaulding's seminal document on the goals and structure of the programme from 1968.

Harry Thode's Report from 1963

Henry 'Harry' Thode, incumbent president of McMaster University at the time of the opening of the Medical School, was not a medical educator, or even academically linked to the medical world, but he felt that a wind of change was blowing through North American medical education when he wrote his report to the Provincial Government in 1963:

McMaster University, as the first institution in Ontario to establish a medical school in two decades, would have a unique opportunity of building a medical center which would provide the best modern facilities for the training of physicians at both the undergraduate and graduate levels. Building on the solid foundation of its strong and research-oriented departments of natural science, unobstructed by vested interests and unfettered by custom and privilege, it could plan an imaginative medical curriculum in which would be incorporated many of the important and exciting advances in medical education today.²⁶⁵

²⁶⁵ Henry Thode, 'Report and Recommendations Regarding a Medical School at McMaster University' Report from 1963. Accreditation Preparation Visit - HHS/FHS Archives, Box 144.2;1. McMaster University, Hamilton,

Armed with a proposal for a \$100 million educational venture,²⁶⁶ Thode was ready to tear down the walls of ‘custom and privilege’, which plagued traditional medical institutions. This cryptic phrase likely refers to the rigid structure of traditional medical schools, in which the curriculum was an expression of turf warfare between departments competing for money and influence rather than a coherent educational programme.²⁶⁷ The text indicates that Thode understood that, ‘as the first institution in Ontario to establish a medical school in two decades’, McMaster chose the right time to do so. Yet while his founding report sets the scene for the new school to be something different entirely, what that could be remains unsaid in this document. It was not until Evans’ memorandum three years later that the contours of McMaster’s philosophy truly appeared.

John Evans’ Memorandum from 1966

The original programme objectives as outlined in 1966 by John Evans largely set the scene for problem-based learning as we know today.²⁶⁸

John Evans’s Eight Point Memorandum of 1966

The Following is an outline of the objectives for the McMaster M.D. Programme as expressed in terms of knowledge, abilities and attitudes that McMaster would like a graduate of the programme to have acquired or developed:

1. The ability to identify and define health problems, and search for information to resolve or manage these problems.
 2. Given a health problem, to examine the underlying physical or behavioural mechanisms. [...]
 3. The ability to recognize, maintain and develop personal characteristics and attitudes required for professional life [...]
 4. The clinical skills and methods required to define and manage health problems of patients, including their physical, emotional and social aspects.
 5. The ability to become a self-directed learner, recognizing personal education needs, selecting appropriate learning resources and evaluating progress.
 6. To assess professional activity, both personal and that of other health professionals
 7. To function as a productive member of a small group, which is engaged in learning, research or healthcare.
 8. To be aware of and able to work in a variety of health care settings.
-

Indeed, ‘the ability to identify and define health problems, and search for information to resolve or manage these problems’ sums up the philosophy of modern problem-based learning as well today as it did in 1966. It is immediately apparent that this short list of objectives (the entire document covers but one page) is written at a very abstract level and does not propose ways in which these ideals could be implemented. That would be left to the care of Bill Spaulding and the Education Committee. Although Evans distanced himself from programme development activities after the first year, this memo was regarded by the early Education Committee much

Ontario, 5. This is the only extract of interest in the paper. The rest is related to financial matters and other issues not related to medical education.

²⁶⁶ Spaulding, *Revitalizing Medical Education*, 20

²⁶⁷ Spaulding called this ‘territoriality’ (Spaulding, *Revitalizing Medical Education*, 77).

²⁶⁸ John Evans, ‘General Objectives’. Memorandum from 1966. Objectives of the Faculty School of Medicine - HHS/FHS Archives, Box 145.8;1. McMaster University, Hamilton, Ontario.

like the 8 Commandments of Medical Education. We will now deconstruct some of the key concepts which appear in this memo.

Knowledge, Abilities & Attitudes

The first point of interest surrounding this memo is to note that Evans divided the programme objectives into ‘knowledge’, ‘abilities’ and ‘attitudes’. Talk of such things as ‘abilities’ and ‘attitudes’ was a fairly novel way of looking at medical education at the time.

By categorizing each of the eight objectives, we can understand the importance that he conceived for each:

Objective	Knowledge	Abilities	Attitudes
1. The ability to identify and define health problems, and search for information to resolve or manage these problems.	X	X	
2. Given a health problem, to examine the underlying physical or behavioural mechanisms.	X		
3. The ability to recognize, maintain and develop personal characteristics and attitudes required for professional life			X
4. The clinical skills and methods required to define and manage health problems of patients, including their physical, emotional and social aspects.	X	X	
5. The ability to become a self-directed learner, recognizing personal education needs, selecting appropriate learning resources and evaluating progress		X	
6. To assess professional activity, both personal and that of other health professionals		X	
7. To function as a productive member of a small group, which is engaged in learning, research or healthcare			X
8. To be aware of and able to work in a variety of health care settings			X

Table 7: The importance of Knowledge, Skills and Attitudes in Evans' Founding Memo

We know not whether Evans intended the order of these objectives to be of significance. Thus, if the order of the objectives is not taken into account, we can conclude from this table that Evans gave equal importance to all three objectives in his founding memo. If the order of the objectives were taken into account, then it would appear that knowledge objectives take precedence over abilities and attitudes. The record of debates in the Education Committee in 1968 suggesting a re-ordering of objectives imply that, at least to those that followed in Evans' footsteps, the order did matter and thus would have impacted on programme development.²⁶⁹

²⁶⁹ Kraemer, 'Education Committee Meeting - October 25, 1968'.

Self-Directed Learning

The other major point of interest in Evans' list of objectives is the use of the term 'self-directed learner'. Whilst the terminology of 'self-directed learning' seems self-evident to the modern educator, the expression was a novelty in the 1960s.²⁷⁰ The precise origins of the expression are somewhat fuzzy, but there appears to be a distinct connection to the Rogerian tradition of education theory that came out of the University of Chicago in the 1950s.

The most obvious reference is to the work of Malcolm Knowles, who titled his most renowned book *Self-directed learning: a guide for learners and teachers*.²⁷¹ The booklet is written as a manual for students and teachers, with practical suggestions, templates for self-directed learning exercises, and stories taken from the author's experience. The practical chapters are interspersed with more theoretical pieces extracted from the works of other authors of influence, and some of the chapters also come with suggested additional reading. However, the reader will note that the book came a decade after Evans' memorandum, and we must therefore look for another origin of the term. Cross-referencing the sources cited in the book with Knowles' autobiography, we can determine that Knowles began his work on self-directed learning in the 1950s, and his ideas were shaped over the years by the work of three of his peers.²⁷²

Firstly, on several occasions Knowles cites the work of Cyril Houle, his doctoral thesis supervisor at the University of Chicago in the 1960s.²⁷³ Houle's most influential work on self-directed learning can be found in his two volumes *Continuing your Education* and *The Inquiring Mind*, both of which were published in the early 1960s.²⁷⁴ Houle attempted to produce a typology of learning, in which he divided learners into goal-oriented, activity-oriented and learning oriented, based on a study of volunteers who identified themselves as self-directed learners.²⁷⁵ Reviewers have implied that the book did not intend to propose a serious scientific classification but more of an intuited suggestion, and indeed, the science of the matter seems somewhat patchy. Although Knowles was no doubt inspired by his teacher, Brockett and Donaghy argue that there is no reason to believe that it was Houle who invented the term 'self-directed learning', suggesting instead that he got it from his student and merely popularised it through his research.²⁷⁶ Additionally, despite its popularity within some selected education circles, the work of Houle and the early work of Knowles was probably not so far

²⁷⁰ The term has its own journal (International Journal of Self-Directed Learning), and a search for the terms 'self-directed learning' in Google Books brings up over 100,000 results.

²⁷¹ Malcolm S Knowles, *Self-directed learning: a guide for learners and teachers*. (Chicago: Association Press, 1975)

²⁷² Malcolm S Knowles, *The making of an adult educator: an autobiographical journey*, 1st ed. (San Francisco, CA: Jossey-Bass, 1989).

²⁷³ Knowles, *Self-directed learning*, 69.

²⁷⁴ Cyril O Houle, *Continuing Your Education* (New York: McGraw-Hill Book Company, 1964); Cyril O Houle, *The Inquiring Mind* (Madison, WI: University of Wisconsin Press, 1961)

²⁷⁵ James B Whipple, and DC Williams, 'The Inquiring Mind. By Cyril O. Houle. The University of Wisconsin Press, 1961', Review in *Adult Education Quarterly* 13 (1963): 122–123.

²⁷⁶ Ralph G. Brockett, and Robert C. Donaghy, 2005, 'Beyond the Inquiring Mind: Cyril Houle's Connection to Self-Directed Learning'. Paper presented at Adult Education Research Conference, Knoxville, TN: The University of Tennessee, 2005. <http://newprairiepress.org/aerc/2005/papers/68/>

reaching that it would have influenced the Founding Fathers of McMaster, so it is extremely unlikely that Evans borrowed the term from either of them.

Secondly, Knowles also mentions the work of Alan Tough on several occasions. Tough, who was a later doctoral student of Houle, was the first to propose a serious study of self-directed learning in adult education in 1971.²⁷⁷ For this study, he devised an interview script, which has served as a basis for many scholars of self-directed learning since then.²⁷⁸ Tough suggested that most adults embark on what he dubbed ‘self-directed learning projects’ throughout their lives, and attempted to outline their nature, purpose and duration.²⁷⁹ But Tough did not start using the idea of ‘self-directed learning’ until he began his work with Houle in the late 1960s, so it is clear that he was not the originator of the idea either.

The most likely source of Knowles and Evans’ inspiration can be found in the reference list of Knowles’ book: the American psychologist Carl Rogers. Rogers is most famous for his ideas on *Client-centred therapy*,²⁸⁰ but he also spent considerable ink writing about education. His theories on the subject were heavily influenced by his concept of psychotherapy, and much of his ideas on learning and *congruence* borrowed from his work with psychology patients.²⁸¹ In his work on education, Rogers made explicit reference to the idea of self-directed learning from 1951 onwards, but developed the idea most prominently in his book *Freedom to Learn* in 1969 in which he argued that teachers should ‘give *self-direction* and freedom to children’.²⁸² In describing his own work with students, Rogers informs the reader that: ‘the major purpose of the programme which will be described would be to set up an environment in which freely self-directed and creative learning could take place’.²⁸³ Knowles discovered the work of Rogers during a class that he took from the latter’s colleague and friend Arthur Shedlin at the University of Chicago in the later 1940s. Although it is not clear whether it was actually Rogers himself or some of his close colleagues from the time who came up with the exact phrasing of ‘self-directed learning’, the ideas around it clearly come from the Chicago group, and from there must have made their way to McMaster. Although the rest of the EC didn’t use the exact term until the late 1970s, they all made some reference to similar concepts, and Walsh even cited ‘T-groups’, a specifically Rogerian mode of therapy that involves expressing feelings in a small group encounter.²⁸⁴

²⁷⁷ Alan Tough, *The Adult’s Learning Projects* (Toronto, Canada: Institute for Studies in Education, 1971).

²⁷⁸ Karen W Scott, ‘Self-directed learners’ concept of self as a learner: congruous autonomy’, *International Journal Of Self-Directed Learning* 3, no. 2 (2006), 1-13.

²⁷⁹ Maurice Gibbons, et al. ‘Toward a Theory of Self-Directed Learning: a Study of Experts Without Formal Training. *Journal of Humanistic Psychology* 20, no. 2 (1980), 41–56.

²⁸⁰ Carl R Rogers, *Client-centered Therapy: Its Current Practice, Implications and Theory* (London, UK: Constable, 1951)

²⁸¹ Congruence, in Rogerian terms, is the idea that to be able to help students learn effectively, teachers must present themselves as honestly and wholly as possible. That is, they must not fake interest where there is not, or hide emotion where emotion is present. Knowles borrowed heavily from this idea (Knowles, *Self-directed learning*, 33)

²⁸² Carl R Rogers, *Freedom to learn*, (Columbus, OH: C. E. Merrill Pub. Co, 1969), 23.

²⁸³ Rogers, *Freedom to Learn*, 190.

²⁸⁴ William Walsh, ‘Attitudes in Medicine - A Draft Submission’, Draft memorandum from January 11, 1968. Educational Programme Committee - 1968 - HHS/ FHS Archives, Box 232.4;4. McMaster University, Hamilton, ON.

The work of John Dewey has sometimes been indirectly associated with self-directed learning,²⁸⁵ and it is true that Dewey spoke of ‘Direction in Education’, when he argued: ‘Control, in truth, means only an emphatic form of direction of powers, and covers the regulation gained by an individual through his own effort quite as much as that brought about when others take the lead’.²⁸⁶ But Dewey himself did not talk in terms of ‘self-directed learning’ explicitly. His education philosophy spans much wider than the idea of empowering learners and the scope of his work is much larger than that of Carl Rogers, notably in its social dimension. We shall reserve a full analysis of the potential influence of Dewey’s ideas on PBL for the end of this chapter.

Arguably, of all the principles underlying PBL, self-directed learning has been the most enduring, but the precise implications of self-directed are seldom discussed. The issue is so important for the future development of PBL that we have reserved an entire chapter for it in chapter 6. For now, we shall say no more of it and focus instead on the other historical ideas that emerged from the founding documents of McMaster and the Founding Fathers.

Bill Spaulding’s Report of 1968

Spaulding’s ten-page report is the first comprehensive and detailed proposal for the school to be. Like Evans’ list, it begins with general considerations that underline the rationale of the programme:

There are two broad objectives:

1. To help students become *effective solvers of biomedical problems, by understanding principles essential to the solution of such problems, and by learning how to seek out and use the information required for their solution.*
2. *To foster attitudes leading to behaviour as responsible physicians and scientists in their relation to patients, colleagues and society. Such behaviour is marked by compassionate concern for patients coupled with action to promote the public good when the physician is faced with ethical decisions.*²⁸⁷

Unlike Evans, Spaulding goes on to indicate in some details how he envisages the programme to play out in practice. He closes his report on musings about the educational principles that underlie this proposal.

In the report, there are references to some of the key themes of McMaster’s educational philosophy – namely ‘motivation’, ‘attitudes’, ‘understanding’ and ‘experience’:

The students will be introduced to patients and their problems during the first weeks of the first year of the course. It is hoped that students, stimulated by this experience, will see the relevance of what they are learning to their future responsibilities, will maintain a high degree of motivation and will begin to understand the importance of responsible professional attitudes.²⁸⁸

²⁸⁵ John B. Mason, ‘Self-Directed Learning: A Deweyan Reconstruction’, Paper presented at the Annual Meeting of the American Educational Research Association (Boston, MA, April 16-20, 1990).

²⁸⁶ John Dewey, *Democracy and Education* (Oxford, UK: Benedicton Classics, 2011), 27. The original text was written in 1916.

²⁸⁷ Spaulding, ‘The Undergraduate Medical Curriculum’, 3.

²⁸⁸ Ibid.

With this declaration of intent, Spaulding deliberately moves away from the separation of the basic sciences and laboratory sciences, which Flexner criticized openly in his report of 1910 in favour of a more integrated approach to learning medicine.²⁸⁹ The idea of motivation is explicitly present in the work of John Dewey, as we shall see – but there is no evidence to suggest that this was of any direct relevance to Spaulding’s ideas. The paper then sets down the role of ‘tutors’:

The faculty will function as tutors or guides to learning, helping students as they wrestle with the problems. To fulfill this function, the faculty tutors will employ small group discussions and laboratory sessions. They will also guide the study of learning resources - printed, graphic, auditory.²⁹⁰

According to available documents, this is not the first explicit use of the word ‘tutor’ to describe the function of faculty in the small group learning environment, which was already employed by Spaulding in 1967,²⁹¹ but it does crystalize this role in an official policy document for the first time. Indeed, Spaulding highlights the role of the tutor in a way that is still very relevant to the role of PBL tutors today.

Amongst other things, Spaulding discusses the subject of assessment – or more appropriately, the lack of formal assessment. Evaluation of students, said Spaulding, would be, ‘to a considerable extent, dependent on frequent evaluation by faculty tutors. A simple grading system of above average, average and unsatisfactory should help to minimize competitive rivalry and still permit the exceptional student to be recognized’.²⁹² This also very much ties into the Rogerian ideals of evaluation, which were driven by self-improvement rather than standardized testing.

The document appears to indicate that the McMaster programme was not concerned with core content so much as key problems of medicine. For the first time, Spaulding explicitly states that the large number of available facts made the determination of a core of content irrelevant.

The hope has been expressed that an agreed-on core of knowledge (and skills) could be identified, not only *in* each medical school, but also *for* all medical schools. [...] It would appear better to stop emphasizing core content and to think in terms of core *questions* or *key problems*. [...] There need not be a fixed core content because there are a number of logical ways of approaching the topic and a very large number of facts.²⁹³

This view of education was not shared by all, as we will see in detail in chapter 4. Finally, Spaulding offered in this document the first outline of what the three-year programme might look like – as we saw in chapter 1.²⁹⁴

²⁸⁹ Abraham Flexner, *Medical education in the United States and Canada: a report to the Carnegie Foundation for the Advancement of Teaching* (No. 4) (Carnegie Foundation for the Advancement of Teaching, 1910)

²⁹⁰ Spaulding, ‘The Undergraduate Medical Curriculum’, 3.

²⁹¹ William Spaulding, ‘Objectives and Outline of the Undergraduate Educational Programme, McMaster Medical School - April 1967’, Memorandum from 1967. Educational Programme Committee - 1966-1967 - HHS/ FHS Archives, Box 232.4;1. McMaster University, Hamilton, Ontario.

²⁹² Spaulding, ‘The Undergraduate Medical Curriculum’, 10.

²⁹³ Ibid.

²⁹⁴ Ibid, 4.

We have seen in Spaulding's work the use of certain terms and concepts that were not in mainstream use in medical education in the 1960s, such as 'attitudes', 'skills', 'motivation' and 'lifelong learning'. This begs the question of the intellectual context in which Spaulding and his peers operated, and whether this context in any way, explicitly or implicitly, influenced the educational programme at McMaster. In the next section, we shall delve deep into the sources cited by the founding father as having influenced them in the build-up of the McMaster education programme.

Identifying the Intellectual Influences of the Founding Fathers

There was little in the way of published reflections on PBL's intellectual history until the 1990s. As we have seen, the Founding Fathers themselves published very little and Spaulding and his team were not renowned men of letters. There is no mention of education philosophy in any publication written by a member of Faculty of McMaster in the 1970s with the exception of John Hamilton's 1976 critique of the programme. Spaulding's 1991 historical account does not broach the topic. And yet, as the McMaster model of Problem-based learning evolved, developed and spread internationally over the years, scholars attempted to bind its philosophy to the thoughts of great education theorists, founders of psychological schools of thought, and important thinkers of the time.

In 1993, Schmidt attributed the characteristics of PBL to, in particular, Karl Popper, John Dewey, Jean Piaget and Jerome Bruner.²⁹⁵ In this paper, Schmidt claimed:

[PBL's] roots can be traced in Dewey's (1929) plea for the fostering of independent learning in children and in Bruner's (1959, 1971) notion of intrinsic motivation as an internal force that drives people to know more about their world.²⁹⁶

He later reiterated this conviction, proposing that PBL, rather than having been invented 'out of the blue, rather was a clever combination of ideas that have been around for already quite some time'.²⁹⁷ Even so, Schmidt confessed that when he himself interviewed Spaulding in 1986, the latter seemed blithely unaware of such influences.²⁹⁸ This begs the question – what philosophical and educational trends were the Founding Fathers aware of? To answer this question we must trace, firstly, any explicit mention of intellectual influences and determine their importance. Secondly, we must consider important but unmentioned writers and authors of the time and the extent to which some of their ideas were realistically reflected in McMaster's philosophy. Should this still provide too thin a grounding for McMaster's founding philosophy, we must then turn to the concrete, environmental influences that may have impacted McMaster's programme, and, finally, the context of the 1960s as a birthing pool for revolutionary educational ideas.

²⁹⁵ Henk G. Schmidt. 'Foundations of problem-based learning: some explanatory notes.' *Medical Education* 27, no. 5 (1993), 422–432.

²⁹⁶ *Ibid*, 423.

²⁹⁷ Henk G. Schmidt, 'A brief history of problem-based learning'. In *One-day, one-problem, an approach to problem-based learning*. Ed. G. O'Grady, et al., (Singapore: Springer Science + Business Media: 2012), 21-40.

²⁹⁸ *Ibid*, 27.

In the follow sections, we shall describe and analyse influence of Abraham Flexner, Johannes Comenius, John Dewey and the Behaviourism *versus* Humanism controversy on problem-based learning as it developed at McMaster.

The Flexner Report

The so-called *Flexner Report* is a comprehensive survey of the state of medical education in North America in 1910, conducted under the auspices of the Carnegie Foundation by Abraham Flexner, the conclusions of which can best be summarised by the following citation: ‘Out-and-out didactic treatment is hopelessly antiquated; it belongs to an age of accepted dogma or supposedly complete information, when the professor "knew" and the students "learned"’.²⁹⁹ In this sub-section, we shall begin by retracing the links between McMaster and the Flexner report through an analysis of archive materials and interviews before highlighting the core principles contained in the *Flexner Report*, and how they relate to the principles of PBL.

In 1979, John Evans retrospectively highlighted the role of Flexner in shaping his thought on the programme.

I think that the educational programme put into practice what people since Addison had been talking about, more than a century before, as the desirable goal - the things that Flexner was really talking about, I think and his ideas, but that didn't get translated that way.³⁰⁰

To this day, John Hamilton, former head of gastroenterology and Chairman of Phase III, still holds that the McMaster programme distilled the essence of the Flexner Report:

I was still head of gastroenterology, running all the clinical programmes and stumbled on Flexner when I was writing up my Horder Memorial Lecture. It developed to a more extensive critique and appraisal of McMaster, and I stumbled upon this report. And I read it, and I could see: “Crumbs! This is laying down foundations that we’ve been laying down in similar ways!”³⁰¹

These statements raise two questions: firstly, how influential was Flexner in actuality in the minds of the Founding Fathers of the McMaster programme? Secondly, was Flexner correctly understood by the Founding Fathers of McMaster, or was his work misinterpreted? Interview evidence suggests that Flexner was at least latently present in the McMaster debate in its early years. John Hamilton states: ‘I cannot recall if the influence of Flexner was clearly recognised. But the approach was along his lines’.³⁰² Dave Sackett believes that everybody at McMaster had read the Flexner report and was familiar with its content, but that the programme was not a ‘copy’ of any of Flexner’s ideas.³⁰³

Some believe even that McMaster developed as a *reaction to* rather than inspired by Flexner. For instance, one of McMaster’s students stated, in his valedictory address of 1982: ‘McMaster

²⁹⁹ Flexner, *Medical education in the United States*, 61.

³⁰⁰ McAuley, *McMaster Oral History - Dr. J.R. Evans*, 46.

³⁰¹ Hamilton, in interview with the author, November 12, 2012.

³⁰² John D Hamilton, ‘Problem-Based Learning: From where to where?’ *The Clinical Teacher*, 2 (2005): 45–48. doi: 10.1111/j.1743-498X.2005.00061.x

³⁰³ Sackett, in interview with the author, by telephone, October 25, 2012.

exists because the Founders perceived a paucity in the traditional education of physicians (and by traditional I mean since the Flexner Report of 1912 (sic)).³⁰⁴ This implies that McMaster's programme developed *a contrario* to the ideas of Flexner. This line of post-flexnerian thought is also followed by Jim Kraemer, who believes that: 'Flexner had been the last... the most recent advance in medical education, and everybody was saying: so, it's about time that we moved once again from it'.³⁰⁵

But both of these interpretations are *post-hoc* rationalizations. Archival evidence reports that an *Ad Hoc* Committee on Undergraduate Education at McMaster engaged in a debate about Flexner in 1969, and the minutes of this particular meeting quote directly from the Flexner Report on two occasions:

Learning Methods: [...] There is no "one best" method or pace. 'Out and out didactic treatment is hopelessly antiquated: it belongs to an age of accepted dogma, or supposedly complete information, when the professor "knew" and the student "learned"'. (Flexner A., *Medical Education in the United States and Canada*, 1910, p.61).

Faculty Responsibility: If the education of students is a major objective of the University, then we feel it is imperative that the tutors responsible for working with the students should be assessed on their merit in this area. They should not be dependent upon research alone for funds and academic promotion. "... it will never happen that every professor in either the medical school or the university faculty is a genuinely productive scientist. There is room for another type - the non-productive assimilative teacher of wide experience, continuous receptivity, critical sense, and responsive interest" (Flexner, A. *Medical Education in the United States and Canada*, 1910, p. 57)³⁰⁶

It would be one thing for this meeting to simply mention Flexner the way one mentions Descartes or Plato – as a sort of background general knowledge, but direct quotes extracted from the report with references to the relevant pages in the report to support ideas proposed at the meeting suggests more than mere lip service to the work of Flexner. Even if opinions are today divided as to the role of Flexner in the McMaster programme, as we have seen, the fact that John Evans thought it influential, that John Hamilton still believes it to be highly relevant and that the *Ad Hoc* Committee directly cited it must lead us to the source – to interrogate the Flexner Report for clues of its influence on PBL, which is what we shall do next.

Flexner was no doctor and the medical world was rather foreign to him, but he was selected by the president of the Carnegie Foundation (possibly for his prior work on American Colleges) to compile a review of medical education in the USA.³⁰⁷ The crux of the Flexner report is a critique of the over-abundance of poor quality medical schools in North America that do not meet the minimum standards of medical education but operate simply as businesses. If one is to believe the report, this was indeed a sore problem in the early 20th century, with very few of America's 155 schools meeting the standards of medical education laid out by Flexner, who names the John Hopkins Medical School as the paragon of good medical education – and

³⁰⁴ Paul Vaughan, 'Valedictory Address, McMaster University MD Class '82, May 14, 1982'. Speech from 1982. Education Programme Committee - 1981-1982 - HHS/FHS Archives, Box 233.3;6. McMaster University, Hamilton, Ontario, 5.

³⁰⁵ Kraemer, in interview with the author, November 20, 2012.

³⁰⁶ Ad Hoc Committee On Undergraduate Education, 'Summary of Report'.

³⁰⁷ Abraham Flexner, *The American College: a criticism* (New York: The Century Co. 1908).

encourages other schools to aspire to its standards. However, buried beneath the commentary on the business model of medical schools in the early twentieth century is a strong, underlying critique of lecture-based education. For indeed, as Ludmerer pointed out in his critique of the work of Flexner:

It is not well known that Flexner had already developed a sophisticated educational philosophy that emphasized the importance of experiential learning (“learning by doing”) at every level of study. It is also not well known that Flexner began his study with the conviction that universities and professional schools had the duty to promote original investigation, not merely to teach.³⁰⁸

Indeed, when looking closely at the Flexner report, one finds many ideas on teaching methods and experiential learning that fit the ideals of the Founding Fathers. Flexner eloquently spoke against the decrepit lecturing model:

Didactic lectures were given in huge, badly lighted amphitheatres, and in these discourses the instruction almost wholly consisted. Personal contact between teacher and student, between student and patient, was lost. No consistent effort was made to adapt medical training to changed circumstances.³⁰⁹

It is not hard to correlate this statement with the words of John Evans, who retrospectively analyzed his reasons for desiring a new model of education:

I hate to admit it in retrospect, but we developed mostly out of negative situations. [...] Remember this was the mid-sixties - the students were really disenchanted with professional education in medicine and yet it should be a terribly exciting experience. [...] In our opinion, the problem was that they were the passive recipients of vast amounts of content knowledge and that they became saturated and bored by it and didn't see the relevance to professional practice.³¹⁰

In fact, the correlation between what Flexner advocated and the policies that came out of McMaster goes beyond the mere criticism of rote learning. Flexner also had the idea that the world of the doctor was changing, that social and interpersonal aspects of the profession were becoming more important than ever before:

The physician's function is fast becoming social and preventive, rather than individual and curative. Upon him society relied to ascertain, and through measures essentially education to enforce the conditions that prevent disease and make positively for physical and moral well-being.³¹¹

This seems to fit with the ‘attitudes’ objectives laid out by John Evans in his 1966 memo, and well as the objectives outlined in Spaulding’s follow-up document – and McMasters’ idea of a Horizontal Programme in which these sorts of skills and attitudes could be learnt, as we shall see later. Indeed, Flexner explicitly makes the same distinction as Evans and Spaulding between knowledge, skills and attitudes. For instance, he states: ‘From the standpoint of the young student, the school is, of course, concerned chiefly with his acquisition of the proper knowledge, attitude, and technique’.³¹² If one were to use the word ‘technique’ interchangeably

³⁰⁸ Kenneth M. Ludmerer, ‘Commentary: understanding the Flexner report.’ *Academic Medicine*, 85(2) (2010), 193–196.

³⁰⁹ Flexner, *Medical education in the United States*, 9. Flexner continues, later in his report: “The lecture indeed continues of limited use. It may be employed in beginning a subject to orient the student, to indicate relations, to forecast a line of study in its practical bearings. [...] Text-books, atlases, charts occupy a similar position. They are not, in the first place, a substitute for sense experience but they may well guide and fill out the student's laboratory findings. In general, the value of the recitation and of the quiz is in proportion to their concreteness and informality. Outside the workshop there is danger of detachment and rote”. Flexner, *Medical education in the United States*, 61.³⁰⁹

³¹⁰ McAuley, ‘McMaster Oral History - Dr. J.R. Evans’, 9.

³¹¹ Flexner, *Medical education in the United States*, 25.

³¹² Flexner, *Medical education in the United States*, 55

with ‘skills’ or ‘abilities’, one could ascribe to Flexner the same framework for medical education as that envisaged by Evans in 1966.

Beyond Flexner’s insights on educational methods, he also shared with the Founders of the McMaster programme the belief that the division between the basic sciences and the clinical sciences was detrimental to a proper medical education. Indeed, Flexner stated: ‘For the purposes of convenience, the medical curriculum may be divided into two parts, according as the work is carried on mainly in laboratories or mainly in the hospital but the distinction is only superficial, for the hospital is itself in the fullest sense a laboratory’.³¹³ This was strongly echoed by Fraser Mustard, who wrote in 1968: ‘I also believe that we should try to achieve, as much integration as possible between the functions of research and education, research and service, and service and education’.³¹⁴

In addition, buried deep within the Flexner report is a short but crucial reference, which has escaped the attention of PBL scholars to date. Indeed, Flexner, seemingly unaware of Walter Cannon’s work at Harvard Medical School, commented on potential suitability of the so-called Harvard Case Method to Medical Education.³¹⁵ We shall return to the Case Method at length, but suffice to note for now that McMasters’ reference to the Case Method may not have been as serendipitous as it first appears:

Some ingenious Harvard men, profiting by the experience of the Harvard Law School, have evolved an effective discipline in the art of inference. Just as a preliminary course in physical diagnosis, teaching the student how to gather his facts, is valuable, so, it is urgent, a formal training in the inductive handling of ascertained data may be of use to students whose logical habit has been none too strictly formed. "Let us assume such and such data: what do they mean? What would you do?" This is the essence of the case method - a method, by the way, excellently adapted to class use, calculated there to develop friction, competition, and interest, which are powerful pedagogical stimulants.³¹⁶

It is interesting to note that here Flexner talks of the Harvard Law School rather than its Business School, in which the Case Method garnered repute. At the time of the Flexner Report, the Harvard Business School was only two years old – and thus this passage by Flexner could indicate an interest in the Case Method for medical education that pre-dates its development by the Harvard Business School.

With all of this said, Flexner and the McMaster Founding Fathers did not agree on every point. In particular, Flexner was quite opposed to the idea of having people admitted to medical school who had no training in chemistry, biology and physics.³¹⁷ By contrast, Evans suggested: ‘Let’s try and make it possible for people from a whole host of different backgrounds to enter into this, rather than strictly from the biological science model, which was still dominating the

³¹³ Flexner, *Medical education in the United States*, 57.

³¹⁴ J. Fraser Mustard, ‘Objectives of the Faculty of Medicine – Letter to D.L. Sackett - 11th November 1968’, letter from 1968. Box 145.8,1. HHS/FHS Archives, McMaster University, Hamilton, Ontario.

³¹⁵ Walter B. Cannon, ‘The Case Method of Teaching Systematic Medicine’, *Boston Medical and Surgical Journal* 142, no. 2 (1900), 31-36.

³¹⁶ Flexner, *Medical education in the United States*, 99.

³¹⁷ Flexner, *Medical education in the United States*, 25

medical schools at this stage of the game'.³¹⁸ Neither did Flexner mention anything about interdisciplinary or cross-disciplinary teaching. In fact, much of his work is devoted to explaining the role and best practice in separate disciplines. In addition, unlike Jim Anderson, Flexner was a vocal proponent of cadaver dissection in medical school. He believed that:

The vastness of the involvements, the relationships of affected locations to each other, the response of the bodily mechanism fighting to achieve a readjustment - only the autopsy can disclose these; and without them, the student cannot attain an intelligent conception of the subject he is studying.³¹⁹

Thus, in making use of prosected specimens encased in plastic rather than bodies for the teaching of anatomy and pathology, Jim Anderson departed from the recommendations brought forward by the Flexner Report. Given the evidence presented here, it is safe to conclude that the writings of Abraham Flexner did in fact have at least some impact on the thinking of the Founding Fathers. How far this influence went remains open to question but there can be little doubt that Flexner's ideas were largely in line with the philosophy of the early days of McMaster and therefore on PBL as an education method.

The *Great Didactic* of Comenius

As we have seen, Flexner was the most talked-about intellectual influence at the time of the Founding of the McMaster programme. The only other education philosopher explicitly mentioned by any of the Founding Fathers in the early years of McMaster is Jan Amos Komensky, a 17th century educator also known by his Latin name Johannes Comenius, whose thinking is encapsulated in the following quote:

That education given shall not be false but real, not superficial but thorough, that is to say, that the rational animal, man, shall be guided, not by intellects of other men but by his own; shall not merely read the opinions of others and grasp their meaning or commit them to memory and repeat them, but shall himself penetrate to the root of things and acquire the habit of genuinely understanding and making use of what he learns.³²⁰

By his own admission, the *Great Didactic* of Comenius served as a guiding influence for Bill Spaulding. As we have discussed in the previous chapter, this fondness for the Moravian scholar was probably an idiosyncrasy of Spaulding. Nonetheless, given the pivotal role that Spaulding played in the programme, it is important to understand Comenius' work and the way in which it might have helped Spaulding to shape his ideas about medical education. We shall therefore explain the central ideas of the *Great Didactic* and show how they were relevant to PBL.

Comenius was a reformer at heart whose belief in the necessity for educational reform lay, firstly, in his own dire educational experiences as a child and adolescent, and secondly, in his spiritual conviction, as a man of the Protestant Church, that 'the seeds of knowledge, virtue and of piety exist in all men'.³²¹ The *Great Didactic* was by far his largest and most renowned work. He wrote this *magnum opus* during his years in exile from Moravia at a time where

³¹⁸ McAuley, 'McMaster Oral History - Dr. J.R. Evans', 9.

³¹⁹ Flexner, *Medical education in the United States*, 67.

³²⁰ Keatinge, *The Great Didactic of John Amos Comenius*, 82.

³²¹ Keatinge, *The Great Didactic of John Amos Comenius*, 84.

Protestants were no longer welcome there - in the belief that someday, God would call upon him to reform education there.³²² He died in Naarden in the Netherlands in 1670, without ever having been able to implement his ideas in his homeland.

The naturalist slant of the *Great Didactic* resonates with the dominance of natural philosophy in his time. Indeed, the premise of Comenius' work is the perfection of God's work in this world – his chief educational concern is, then, to borrow from this perfect natural order of things rather than to attempt to instruct through artificial didactics. Throughout the book, Comenius expends considerable effort comparing the work of the teacher and the role of schools to what can be observed in the natural world; using the metaphors of birds' nest-building, the gardener tending to his plants, and the methods of a carpenter in house-building to lend support to his theories. For instance, Comenius starts with the principle that 'nature prepares the material, before she begins to give it form'.³²³ And yet he observes that:

Against this principle, schools are offenders: firstly, because they take no care to prepare beforehand the pictures, diagrams, etc. and to have them in readiness for general use, but at the moment that they need this or that, they make experiments, draw, dictate, copy etc., and when this is done by a careless or unskilled teacher (and their number increases daily), the result is deplorable.³²⁴

These principles were so important to him that he dedicated five entire chapters to comparing the order of nature and the deviations therefrom by schools, and kept the theme running throughout the rest of his work. This naturalist stance was strongly echoed by some education philosophers of the enlightenment, in particular Jean Jacques Rousseau.³²⁵ Beyond the naturalist perspective and religious undertones of the *Didactica Magna*, at its core lies the author's grief with the methods of instruction of his time – methods which, he believed, stood in the way of true intellectual development:

It is true that very few scale the heights of wisdom, though many start gaily on the journey, and that those who get any distance do so at the cost of toil, loss of breath, weariness and giddiness; this, however, does not prove that there is anything inaccessible to the human intellect, but only that the steps are not well disposed, or are insufficient, dangerous and in bad repair – in other words, that the method is complicated.³²⁶

And thus, Comenius proposes detailed remedies for the ills of classical education. The chief principles of his educational proposition are as follows: firstly, that teaching and learning should be easy and pleasant, based on the interest of the pupil and not on coercion. Comenius advocated culling the number of hours spent on class benches and increasing the time spent on private study:

The ease and pleasantness of study will therefore be increased:

- (i) If the class instruction be curtailed as much as possible, namely to four hours, and if the same length of time be left for private study.
- (ii) If the pupils be forced to memorise as little as possible, that is to say, only the most important things; of the rest they need only grasp the general meaning.³²⁷

³²² Ibid, 9-15.

³²³ Ibid, 114.

³²⁴ Ibid, 115.

³²⁵ See in particular Jean Jacques Rousseau, *A discourse upon the origin and foundation of the inequality among mankind* (New York: B. Franklin. 1971).

³²⁶ Keatinge, *The Great Didactic of John Amos Comenius*, 86.

³²⁷ Ibid, 137.

Secondly, Comenius strongly supported the integration and contextualization of knowledge in the learning process. To do this, he advocated that students should themselves endeavour to teach their peers:

Questioning takes place when a pupil interrogates his teachers, his companions, or his books about some subject that he does not understand. Retention follows when the information is committed to memory, or is written down for greater security [...]. Teaching takes place when knowledge that has been acquired is communicated to fellow-pupils or other companions.³²⁸

Finally, Comenius delivers a peculiar tirade against the over-burdening of curricula with useless information (by which he means the dilution of piety with ‘heathen’ texts).³²⁹ In the interest of conciseness, Comenius proposes a rather martial style of teaching based on authority, punishment, reward and standardization, which seems quite incongruent with his other two principles – and only makes sense if one takes into account the strong religious dogma underlying his writing. Any modern scholar of the likes of Spaulding would likely have shrugged this off as the natural disposition of a seventeenth century man of the church.

Thus were laid out the core arguments of the *Didactica Magna* – and one can see that although this was written four centuries before any of the Founding Fathers of McMaster University were involved in education, there is much of interest in this ancient text. Piety and virtue aside, Comenius clearly understood two ideas that resonate through the entire McMaster programme: that interest is key to learning, and that the student who becomes a teacher to his peers is more likely to truly learn. Through Spaulding, those ideas may well have permeated the McMaster experiment and thus indelibly tinted Problem-based learning.

John Dewey

Considering that PBL has so often been associated with the work of John Dewey,³³⁰ it is odd to note that there is only one passing mention of the great early twentieth century education philosopher in all of the archival evidence scrutinized for this project. Said reference is a quote from a report of the Ad Hoc Committee on Undergraduate Education of 1969, which reads:

Science has been taught too much as an accumulation of ready-made material, with which students are to be made familiar, not enough as a method of thinking, an attitude of mind, after the pattern of which mental habits are to be transformed' (Dewey: Science as Subject-Matter and as Method. Science xxxi, No. 787, p. 122).³³¹

In addition, none of the interviewees who participated in this research reported any explicit influence of Dewey, either on their own thoughts or on the Founding Fathers'. The only public association made between the McMaster programme and Dewey's philosophy was published in 1976 by John Hamilton, who opened his article ‘The McMaster Curriculum: a Critique’ with the same quote as was used by the Ad Hoc Committee mentioned above.³³² It is not impossible,

³²⁸ Keatinge, *The Great Didactic of John Amos Comenius* 156.

³²⁹ Ibid, 180.

³³⁰ See for instance: John R. Savery, and Thomas M Duffy, ‘Problem based learning: An instructional model and its constructivist framework’, *Educational technology* 35, no. 5 (1995): 31-38; or M. Savin-Baden, *Problem-based learning in higher education: Untold stories* (McGraw-Hill International, 2000).

³³¹ Ad Hoc Committee On Undergraduate Education, ‘Summary of Report’.

³³² Hamilton, ‘The McMaster Curriculum’, 1.

given the dual use of this quote, that its source is identical, thus further limiting the direct ties between McMaster and Dewey.

And yet, Schmidt wrote in 1993 that PBL's 'roots can be traced in Dewey's (1929) plea for the fostering of independent learning in children'.³³³ The position taken by education historian Bruce Kimball in his *Emergence of Case Method Teaching* (which, as we shall see, is strongly connected to PBL) supports Schmidt's argument.³³⁴ Indeed, Kimball notes the existence of a plethora of writings from the early 20th Century that refer to Dewey explicitly as a justification for the so-called 'problem-method'³³⁵ or 'problem-project method'.³³⁶ This early application of Dewey's philosophy translated his thoughts into problematized project-work, of the sort that can still be seen today in Denmark's Reformed Universities in Roskilde and Aalborg. However, its real impact in higher education philosophy, according to Kimball, was in the development of the Harvard Business School's problem-based Case Method. The details of this method and its development will be covered extensively in the next section of this thesis. However, the purpose of this argument is to establish the importance of Dewey's system of thought as a philosophical antecedent to PBL, and to do this, it is necessary to pore over the original works of Dewey attentively. Given the lack of explicit connection between Dewey and McMaster, our hope resides in constructing a solid argument around the proposition that although Dewey was not an explicit influence on McMasters' philosophy, his work was such an important part of the *zeitgeist* of American education in the early to mid-twentieth century, that his influence permeated indirectly throughout the McMaster curriculum. We base this notion on Apple and Tietelbaum's claim that Dewey 'is generally recognised as the most renowned American educator of the twentieth century'³³⁷ – a claim supported by a search through Google Scholar's citation index, which reveals that each of Dewey's major works has been cited between 10 000 and 20 000 times.³³⁸

The work of Dewey spans across several decades in the late nineteenth and early twentieth century, comprising 37 volumes in total, of which the six most influential are, according to Apple and Teitelbaum: *The School and Society* (1899), *The Child and The Curriculum* (1902), *How we Think* (1910), *Democracy and Education* (1916), *The Public and its Problems* (1927) and *Experience and Education* (1938).³³⁹ Only the most devoted Deweyan endeavour would require reading all six, but for the purposes of this treatise, two representative volumes were selected. Firstly, *How we Think*, in its re-edition of 1933, chosen for its distinct quasi-

³³³ Schmidt, 'Foundations of problem-based learning', 423.

³³⁴ Bruce A. Kimball, *Emergence of case method teaching, 1870s-1990s* (Bloomington, IN: The Poynter Center, Indiana University, 1995).

³³⁵ A. Bess Clark, 'An Experiment in Problem-Teaching.' *The English Journal* 6, no. 8 (1917), 535–538.

³³⁶ James F. Hoscic, 'An Outline of the Problem-Project Method', *The English Journal* 7, no. 9 (1918), 599–603.

³³⁷ Michael W Apple and Kenneth Teitelbaum. 'John Dewey, 1859 – 1952'. In *Fifty major thinkers on education - from Confucius to Dewey*, ed. Joy A Palmer. Kindle edition. (London, New York: Routledge, 2001), 177.

³³⁸ When accessing the Dutch version of Google Scholar and entering key words 'John Dewey', the first entries are Dewey's major works. Beneath each entry, a citation index can be found. For instance, for *How We Think*, the citation index is 11,846. For *Democracy and Education*, it is 19,111. The reliability of Google Scholar's citation index is still to be established but currently provides a reasonable benchmark. Google Scholar. Accessed March 15, 2014. <http://scholar.google.nl/>

³³⁹ Apple and Teitelbaum, 'John Dewey, 1859 - 1952', 181.

psychological angle, and because it was cited by Kimball as a work of great importance in the history of problem education.³⁴⁰ Secondly, *Democracy and Education*, probably Dewey's most political treatise on education, chosen for its strong societal implications. The two volumes together, aided by more recent analyses of Dewey's work, provide us with a good grasp of Dewey's thought system. A reading of *Democracy and Education* and *How we Think* reveals that Dewey did not make any explicit reference to 'self-directed learning', 'problem-based learning' or any other jargonistic term that arose in the 1960s and 1970s. However, there are passages from his work that clearly promote a move away from teacher-centric, entirely abstract, formal education in favour of experience-based, student-centred learning.

Firstly, Dewey talks explicitly about education in terms of 'problems', as seen in this passage from *Democracy and Education*:

Is there anything but a problem? Does the question naturally suggest itself within some situation or personal experience? Or is it an aloof thing, a problem only for the purposes of conveying instruction in some school topic? Is it the sort of trying that would arouse observation and engage experimentation outside of school? [...] Is it the pupil's own problem, or is it the teacher's or textbook's problem, made a problem for the pupil only because he cannot get the required mark or be promoted or win the teacher's approval unless he deals with it?³⁴¹

The reference to problems forms the basis of the argumentation in *How we Think*: Dewey sees the problem as core to the very notion of reflective thinking. Additionally, Dewey broadens the definition of a problem to encompass situations in which questions are not clearly formulated, but a phenomenon wants explaining instead. Taking the example of a man that finds himself perplexed at a change in weather conditions, Dewey writes:

To say that the abrupt occurrence of the change of temperature constitutes a problem may sound forced and artificial; but if we are willing to extend the meaning of the word *problem* to whatever - no matter how slight and commonplace in character - perplexes and challenges the mind so that it makes belief at all uncertain, there is a genuine problem, or question, involved in an experience of sudden change.³⁴²

To illustrate his point, Dewey gives a detailed description of a scientific problem illustrated by bubbles and crockery, leading us through his thought process as he moves to its resolution. Throughout, he uses his prior knowledge to resolve the issues that he has himself defined:

In washing tumblers in hot soapsuds and placing them mouth downward on a plate, I noticed that bubbles appeared on the outside of the mouth of the tumblers and then went inside. Why? The presence of bubbles suggested air, which I note must come from inside the tumbler. I see that the soapy water on the plate prevents escape of the air save as it may be caught in bubbles. But why should air leave the tumbler? There was no substance entering to force it out. It must have expanded. It expands by increase of heat or by increase of pressure, or by both. Could the air have become heated after the tumbler was taken from the hot suds? Clearly not the air that was already entangled in the water. If heated air was the cause, cold air must have entered in transferring the tumblers from the suds to the plate. I test to see whether this supposition is true by taking several more tumblers out. Some I shake so as to make sure of entrapping cold air in them. Some I take out, holding them mouth downwards in order to prevent cold air from entering. Bubbles appear on the outside of every one of the former and none of the latter. I must be right in my inference. Air from the outside must have been expanded by the heat of the tumbler, which explains the appearance of the bubbles on the outside. But why do they go inside then? Cold contracts. The tumbler

³⁴⁰ John Dewey, *How we Think* (Lexington MA: D.C. Heath and Company, 1933)

³⁴¹ Dewey, *Democracy and Education*, 143.

³⁴² Dewey, *How We Think*, 13.

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cooled and also the air inside it. Tension was removed, and hence bubbles appeared inside. To be sure of this, I test by placing a cap of ice on the tumbler while the bubbles are still forming on the outside. They soon reverse.³⁴³

This form of problem found its way into PBL as it was practiced in Maastricht in essentially the same format, and essentially with the same reference to prior knowledge, as we shall see in chapters 3 and 4. It is interesting to note here the bridge made between educational problems and real-life situations, something that ties in closely with Spaulding's idea that students should 'see the relevance of what they are learning to their future responsibilities'.³⁴⁴ According to Eric Weber, this ties in to Dewey's strongly pragmatic ideas on education and development.³⁴⁵ It is clear that Dewey was neither a liberal in the Rawlsian sense nor a communitarian in the sense that Vygotsky might have been.³⁴⁶ He saw the necessity of relating education to real life as means of providing meaning to education for the person experiencing it – in that sense; the person's growth for Dewey was a goal in and of itself.³⁴⁷ Thus, in many senses, Dewey's conjectures with regards to the role of prior knowledge can be said to have foreshadowed the cognitive revolution (which will be discussed at length in chapter 4), although Dewey connected his views on prior knowledge to lived, direct experience and meaning rather than cognitive efficiency:

To a person just beginning algebra and physics, the idea of 'exponent' and 'atom' are technical - they stand alone. He is not aware of these meanings in connection with the objects and acts of his ordinary experience; they do not seem to be contained in even the materials of his high school experience. To the mature scientist, on the contrary, the ideas are much less technical because they enter into so many experiences that have become familiar to him as a scientific inquirer. During the early stages of experience and for the greater part of *all* experience, save that of specialists, the common elements are the *human* elements, those connected with the relations of one person to another and to groups. The most important thing to the child are his connections with father and mother, brother and sister. Elements connected with them recur in most of the experiences he has. They saturate the greater number of his experiences and supply them with their meaning. These human and social factors are accordingly those that carry over and can be carried over most readily from one experience to another. They furnish the material best suited for the development of generalized abilities of thinking. One reason why much of elementary schooling is so useless for the development of reflective attitudes is that, on entering school life, a break is suddenly made in the life of the child, a break with those of his experiences that are saturated with social values and qualities. Schooling is then technical because of its isolation, and the child's thinking cannot operate because school has nothing in common with his earlier experiences.³⁴⁸

The way in which Dewey described the process by which students tackle problems is reminiscent of what occurs in a problem-based tutorial. According to Dewey, people engaged in *conjectural anticipation*: 'a tentative interpretation of the given elements, attributing to them a tendency to effect certain consequences'³⁴⁹ - which in turn led to considering all aspects of a problem, then drawing up a hypothesis and developing from there a plan of action (testing the

³⁴³ Dewey, *How We Think*, 93-94.

³⁴⁴ Spaulding, 'The Undergraduate Medical Curriculum', 3.

³⁴⁵ Eric T. Weber, 'Dewey and Rawls on Education', *Human Studies* 31, no. 4 (2008): 361-382.

³⁴⁶ Michael Glassman, 'Dewey and Vygotsky: Society, experience, and inquiry in educational practice', *Educational Researcher* 30, no. 4 (2001): 3-14.

³⁴⁷ Weber, 'Dewey and Rawls'.

³⁴⁸ Dewey, *How we Think*, 68.

³⁴⁹ Dewey, *Democracy and Education*, 138.

hypothesis). Dewey pointed out that this systematic approach to inquiry is distinct from trial and error – and while tutorial structure may not have been so relevant to the earliest days of PBL, it certainly became the *modus operandi* of PBL tutorials in the later days, as we shall see.

Much of Dewey's thought about problems as an instrument to engage students in their learning rapidly turned into a vivid criticism of traditional education. Like Flexner, he did not believe that facts merely imparted through lectures would be learnt: 'no thought, no idea, can possibly be conveyed as an idea from one person to another. When it is told, it is, to the one whom it is told, another given fact, not an idea'.³⁵⁰ Of course, Dewey did not mean that the teacher should merely stand back and look on, but should join in the discussion as a peer: 'In such shared activity, the teacher is a learner, and the learner is, without knowing it, a teacher'.³⁵¹ In this regard there is a certain convergence with we have learnt from Comenius. Part of his criticism of education traditions is aimed at teacher-directed 'textbook' problems, which are not conducive to true learning. As he points out, the pupil's only issue becomes dealing with the teacher's requirements rather than with the subject matter itself.³⁵² That is to say, Dewey believed that educational problems must engage the student independently of the threat of an examination or a mark: the student must take ownership of the problem rather than find ways to earn good points from the teacher. In writing as he did, Dewey unwittingly ushered in the idea of intrinsic motivation in education. This line of reasoning certainly held sway at McMaster University, where the fear of seeing students learn for the sake of examinations initially led standardized testing to be scrapped outright.³⁵³

Although Dewey advocated a form of freedom to learn, it would be a misunderstanding of his ideas to equate them with unguided learning. Indeed, the role of teachers in education was one of the main reasons of his fall-out with his idealistic former student William Kilpatrick.³⁵⁴ According to Knoll, Kilpatrick pushed the freedom envelope too long and too hard, resulting in the demise of his project method due to its lack of structure and form – an unfortunate conclusion, which Knoll explains, rather harshly, as follows:

It would have honored Kilpatrick, and made him a creditable pedagogue and a true disciple of Dewey, had he abandoned not only the project term but also his sentimental, child-centered program of education, and taken to heart the warning already uttered by Dewey (1897a, 93) in his "Pedagogic Creed," and which is still valid today – perhaps more than ever: "Next to deadness and dullness, formalism and routine, our education is threatened with no greater evil than sentimentalism".³⁵⁵

Indeed, Dewey's stinging critique of "free" forms of education in the 1933 re-edition of *How we Think* rings even harder than his antipathy for traditional methods of teaching. Instead,

³⁵⁰ Dewey, *Democracy and Education*, 147.

³⁵¹ Dewey, *Democracy and Education*, 148.

³⁵² Dewey, *Democracy and Education*, 144.

³⁵³ An extract from an undated document (circa 1967) of the Education Committee outlines this point: The following proposals are made for the consideration of the committee: 1. Comprehensive methods of assessment should be stressed and classical methods, particularly those which are confined to one academic discipline should be avoided. 2. The results of assessment should be graded but not marked. Unknown, 'Related Policies: Assessment of Students'. Undated memorandum. Educational Programme Committee - 1966-1967 - HHS/ FHS Archives, Box 232.4;1. McMaster University, Hamilton, Ontario.

³⁵⁴ Michael Knoll. 'A Marriage on the Rocks: An Unknown Letter by William H. Kilpatrick about His Project Method', *Online Submission (2010)*. <http://eric.ed.gov/?id=ED511129>

³⁵⁵ Knoll, 'A Marriage on the Rocks', 10.

Dewey recommended a guiding role for teachers by means of questioning, not unlike the Socratic Method:

The art of conducting a recitation is, then, very largely the art of questioning pupils so as to direct their own inquiries and so as to form in them the independent habit of inquiry in both of its directions; namely, inquiry in *observation* and recollection for the subject matter that is pertinent and inquiry through *reasoning* into the meaning of material that is present. The art of questioning is so fully the art of guiding learning that hard and fast rules cannot be laid down for its exercise.³⁵⁶

It can be understood that Dewey aspired for teachers to give students just enough data to resolve the problems on their own, while moving them along through questions when they lacked the knowledge or structure to proceed.³⁵⁷ It could be argued that Dewey is *de facto* referring to the idea of ‘scaffolding’ in a Vygotskian sense. However, Glassman explicitly demarcates Dewey’s ideas of teachers as *facilitators* from the much more interventionist role that Vygotsky assigns to them in his theory of the *Zone of Proximal Development* - in which the scaffolding by more knowledgeable peers occurs in a much more systematic and controlled fashion.³⁵⁸

Upon inspection of Spaulding’s initial sketch of the role of the tutor, it is not immediately clear which of the two ideas held sway at McMaster, but it appears that the following passage holds more Vygotskian echoes than Deweyan ideas:

The faculty tutor can introduce a topic to his small group, can help students decide how they will learn about the topic, can indicate the learning resources available, and can himself be a learning resource for his students.³⁵⁹

Ideas surrounding the role of teachers and tutors shall be further developed in chapters 5 and 6 of this treatise. As we have seen in this extensive exposé of Dewey’s theories on educational problems, there is a great deal of overlap in the ideas of Dewey and the main tenets of the original documents by Evans and Spaulding that we analysed in depth earlier in this chapter. It is thus not unreasonable to surmise that a wind of change, possibly initiated by Dewey’s work, was blowing over North American education at the time of the founding of McMaster’s programme – a wind which Harry Thode had picked up on as early as 1963, as we have seen. The bulk of Dewey’s work predates McMaster’s medical school by almost four decades, but by Apple and Tietelbaum’s admission, his ideas were not immediately absorbed into the American education system at the time of their publication.³⁶⁰ It is probable that the historical context of the 1960s and 1970s provided a much more fertile ground for Dewey’s ideas to find root, as diffuse as those roots might be.

Behaviourism, Humanism and the Mager controversy

Between the early 1950s and mid 1960s, a movement rooted in behaviourism found its way into education theory. The so-called ‘Programmed Instruction Movement’ was heavily inspired

³⁵⁶ Dewey, *How we Think*, 266.

³⁵⁷ Dewey, *Democracy and education*, 145.

³⁵⁸ Glassman, ‘Dewey and Vygotsky’, 3–14. The Zone of Proximal Development is described in Lev Vygotsky, *Thought and Language*, trans. Alexander Kozulin, (Cambridge, MA: The MIT Press, 1986), 187.

³⁵⁹ Spaulding, ‘The Undergraduate Medical Curriculum’, 9.

³⁶⁰ Apple and Teitelbaum, ‘John Dewey, 1859 – 1952’, 177.

by the work of Burrhus Skinner. This school of thought evolved almost in parallel to the humanist psychology movement of Rogers and colleagues, despite their incompatible premises, sowing confusion amongst educational institutions. McMaster was not immune from this confusion, and this section will retrace how the two schools of thought battled it out for the soul of PBL in the early years of McMaster.

In 'Teaching Machine', a manifesto for a new age of programmed education, Skinner proposed that audio-visual instruction aids such as the television and the tape-recorders would supplant lectures, textbooks and demonstrations.³⁶¹ But, Skinner argued, such aids should not be used merely to present content - instead, they should teach. His idea of constructing a 'teaching machine' was inspired by the work of Pressey in the 1920s.³⁶² Skinner's approach to education was not much different to his work with animals, namely: 'by arranging appropriate 'contingencies of reinforcement', specific forms of behaviour can be maintained in strength for long periods of time'.³⁶³ The essence of his short treatise follows the precepts of classical behaviourism: reward mechanisms that provide positive reinforcements for desired responses to stimuli and negative reinforcements for undesired responses to stimuli. In order for the conditioning to work, Skinner prescribes small steps that must be taken in sequences of increasing complexity - and his machine ensures that no step can be taken until the previous one has been completed. This is done by a succession of 'frames' that the learner must complete in logical order. Skinner faced, among others, the criticism that his methods did not allow students to think through a problem because they merely produced automated responses.³⁶⁴ He addressed this by considering 'thinking' to be just another programmable form of behaviour: 'a more sensible programme is to analyse the behavior called 'thinking' and produce it according to specifications'.³⁶⁵

Skinner's views may seem somewhat lacklustre in comparison to the proposals of humanist psychology, but behaviourism found in Robert Mager its educational champion of the sixties, as explained by Norman:

In the sixties psychology was dominated by behaviourism, which assumed that all behaviour could be explained by response to stimuli. That was translated into education as instruction should be based on "behavioural objectives" which, so it went, could be taught, learned and evaluated. Courses were taught on how to write good objectives. Books were filled with hundreds of pages of objectives. [...]. The "bible" of this movement was Mager R. Preparing Instructional Objectives.³⁶⁶

Indeed, one will find Mager's 60-page booklet to be filled with surgically precise instructions on constructing learning objectives, as he explicitly purports to practice his techniques on the reader. The tone is set from the first few pages:

It is assumed that you are interested in preparing effective instruction and that you have taught, are teaching, or are learning to teach. It is further assumed that you are interested in communicating certain

³⁶¹ Burrhus F. Skinner, 'Teaching machines', *Science* 128, no. 3330 (1958): 969.

³⁶² Ludy T. Benjamin, 'A history of teaching machines', *American psychologist* 43, no. 9 (1988), 703.

³⁶³ Skinner, 'Teaching Machines', 970.

³⁶⁴ Skinner, 'Teaching Machines', 975.

³⁶⁵ *Ibid.*

³⁶⁶ Geoffrey Norman, *in correspondence with the author*, February 20, 2013

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skills and knowledge to your students and in communicating them in such a way that your students will be able to *demonstrate* their achievement of *your* instructional objectives.³⁶⁷

The emphasis here is on teaching, rather than learning, and on the objectives as determined by the instructor rather than the student. Whilst this tone of writing is typical of the behaviourist school, it runs in fundamental opposition to self-directed education, as described in the section on self-direction. Located at the opposite end of the direction spectrum in education from behaviourism, Rogers posited that ‘self-initiated learning which involves the whole person of the learner - feelings as well as intellect - is the most lasting and pervasive’.³⁶⁸ The notion of ‘feelings’, which was central to Rogerian thought, was completely alien to behaviourism.

The behaviourist school explicitly attempted a ‘scientific’ deconstruction of learning, which resulted in the production of an array of jargon to describe the desirable outcomes of learning. Thus, for Mager, ‘an objective is meaningful to the extent it communicates an instructional intent to its reader and does so to the degree that it describes or defines the terminal behavior expected of the learner’.³⁶⁹ In behaviourist language, ‘terminal behavior refers to the behavior you would like your learner to be able to demonstrate at the time your influence over him ends’.³⁷⁰ Mager openly rejected any partaking in education philosophy,³⁷¹ but it could be argued that his position makes some very fundamental claims about the human mind, which are, at their core, philosophical rather than scientific. This is evidenced by his statement that: ‘the machinist does not select a tool until he knows what operation he intends to perform. Neither does a composer orchestrate a score until he knows what operation he intends to perform’.³⁷² Such a perspective leaves no room for fuzzy notions such as inspiration, imagination, free will and creativity. The implication is unmistakable: rational humans act deliberately at all times and in all circumstances. This thinking is laden with consequences for learning. If individuals are neither endowed with free will nor imagination, then learning is mechanistic, and learner performance can only be evaluated in the observation of the mechanical output of his or her body (either spoken, written or physically performed): ‘Since no one can see into another’s mind to determine what he knows, you can only determine the state of a learner’s intellect or skill by observing some aspect of his behaviour performance’.³⁷³ These assumption run contrary to everything that Rogers believed about learning: ‘Independence, creativity, and self-reliance are all facilitated when self-criticism and self-evaluation are basic and evaluation by others is of secondary importance’.³⁷⁴

The crux of this debate lies indeed around the issue of assessment. For Mager, this is a clear and simple matter. Assessment might look something like this: ‘given a list of 35 chemical

³⁶⁷ Robert F. Mager, *Preparing Instructional Objectives* (Palo Alto, CA: Fearon Publishers, 1962), viii.

³⁶⁸ Rogers, *Freedom to learn*, 163.

³⁶⁹ Mager, *Preparing Instructional Objectives*, 43.

³⁷⁰ Mager, *Preparing Instructional Objectives*, 2.

³⁷¹ Mager, *Preparing Instructional Objectives*, viii.

³⁷² Mager, *Preparing Instructional Objectives*, 3.

³⁷³ Mager, *Preparing Instructional Objectives*, 13.

³⁷⁴ Rogers, *Freedom to learn*, 163.

elements, the learner must be able to recall and write the valences of at least 30'.³⁷⁵ Rogers, by contrast, offers a somewhat more nuanced approach to the subject:

Curiously, a positive evaluation is as threatening in the long run as a negative one, since to inform someone that he is good implies that you also have the right to tell him he is bad. So I have come to feel that the more I can keep a relationship free of judgment and evaluation, the more this will permit the other person to reach the point where he recognizes that the locus of evaluation, the center of responsibility, lies within himself. The meaning and value of his experience is in the last analysis something which is up to him, and no amount of external judgment can alter this. So I should like to work towards a relationship in which I am not, even in my own feelings, evaluating him. This I believe can set him free to be a self-responsible person.³⁷⁶

The end result of Magerian thought is that 'the more objectives you include, the more successfully you will communicate your intent'.³⁷⁷ The end result of Rogerian thought is that learning can only be determined by the learner, for the learner. The outcomes of this debate can be seen in the table below:

Educational Aspect	R.F. Mager	C. Rogers
Purpose of education	For learners to demonstrate that they can perform or behave in a certain way.	To be significant to the learner with regards to his own experience.
Person who determines what should be learnt	The instructor / "programmer"	The learner, with the guidance of the instructor.
How learning is evaluated	Through the use test questions which accurately reflect the learning objectives of the instructor.	Through an agreed evaluation plan in which the learner sets the criteria for his own learning, with the guidance of the instructor.
Determinants of success	The appropriate terminal behaviour has been achieved, according to the criterion determined for this behaviour	The learner feels that he had learnt something meaningful to him.

Table 8: Comparison of Mager's and Rogers' approach to Educational Objectives.

Although the above analysis would *a priori* suggest that McMaster's progressive programme would not have much place for behaviourist thinking, both archival and oral evidence surprisingly suggests the contrary. Indeed, the evidence suggests that the founding father of McMaster were rather confused about the issues and tried to integrate both schools of thought without a thorough understanding of their epistemological incompatibility.

Correspondence between Dave Sackett and George Sweeney from 1971 indicates that Magerian learning objectives were very much a common reference at McMaster, even though neither of the correspondents was particularly affiliated with or even partial to the behaviourist movement:

³⁷⁵ Mager, *Preparing Instructional Objectives*, 28.

³⁷⁶ Carl Rogers, 'The Characteristics of a Helping Relationship'. Re-typed extract from an article from 1958. Phase I - Introduction, Simulated Patients, Clinical Skills, Evaluation, Interviewing - 1979 - HHS / FHS Archives, Box 244.1;1. McMaster University, Hamilton, Ontario, 4.

³⁷⁷ Mager, *Preparing Instructional Objectives*, 18.

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Dear George, enclosed, as promised the other night, are educational objectives (Magerian!), resources, and problems suggested for Phase II - Ischaemia. I hope that this will provide a framework for pulling the stuff together and assisting the tutors.³⁷⁸

The omnipresence of Mager was confirmed by Jim Kraemer, who raised the subject in his interview:

Oh yeah. Yeah. I mean... I remember sitting through sessions and committees. I sat on... God knows how many... 25 various sub-committees and curriculum committees. And they developed absolutely encyclopaedic listings of knowledge that students should have. They developed objectives, they were all forced into getting... was it Robert Mager or whatever his name, who talked about learning objectives... was the magazine... a book that people used as the bible.³⁷⁹

The fact that he refers to Mager's work as a 'Bible' can leave no doubt as to its importance, in his memory. However, just as his reminiscence implies that abiding by Magerian objectives was a tedious process, so archival evidence also indicates that Mager was not so readily accepted or applied by everybody. Already in 1968, some of the pioneers of McMaster's programme were questioning the applicability of behaviourist objectives to modern medical education.

Dr. Mueller suggested that the ideal product of a medical education would demonstrate a) interest, b) industry c) creativity d) responsibility e) personal stability f) ability to transform basic information into clinical relevance g) social attitudes and knowledge of the art. He emphasized that the Council exams normally stress the last of these and medical education tends to reflect a similar pattern. Dr. Mueller suggested that the difficulty in applying Mager to this end product is in apportioning values to these particular objectives that are flexible enough to apply to various stages in a medical career, in particular the M.D. degree. Once these values were apportioned, Magerian objectives could be determined and failure to demonstrate the appropriate behaviour would result in failure to obtain the McMaster M.D.³⁸⁰

Despite the difficulty, it would seem that Dr. Mueller adamantly attempted to apportion quantitative values to these 'ideal products' of medical education such that they could be measured against Magerian objectives. In his usual facetious style, Jim Anderson may have been the most outspoken critic of behaviourist evaluation methods, at least as far as the any evidence is available of the subject. Even then, his critique is far from virulent for a man allegedly so moved by educational freedom:

Evaluation sessions in small groups with a tutor follow each unit. A) Our aims for each unit are not as easily formulated as I thought they would be. My head is bloody and bowed (Chairman of Medicine, please note) but a lot of the things we have done well have not been capable of being expressed in Magerian terms and so have been very difficult to evaluate.³⁸¹

Strangely though, the harshest recorded critique of Mager came from an unknown source, in a handbook drafted in 1979.

How specific should objectives be? In 1962, an educator named Mager published what has become a classic monograph on objectives. He advocated highly specific objectives which detail those observable 'behaviours' a learner should display to demonstrate learning achievement. [...] Since then, highly specific

³⁷⁸ David Sackett, 'Re: Phase II - Ischaemia - To: Dr. G.D. Sweeney'. Letter from 1971. Phase II Ischaemia (1969-1970) - HHS/ FHS Archives, Box 242.1;7. McMaster University, Hamilton, Ontario.

³⁷⁹ Kraemer, in interview with the author, November 20, 2012.

³⁸⁰ Kraemer, 'Education Committee Meeting - October 11, 1968'.

³⁸¹ James Anderson, 'Re: Progress Report - To: Faculty involved in Phase I'. Report from 1969. Educational Programme Committee - 1969 - HHS / FHS Archives, Box 232.5;4. McMaster University, Hamilton, Ontario.

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objectives have become a fad. As discussed above [...] there is no convincing evidence that detailed objectives promote student learning.³⁸²

Perhaps this spurt of anti-Magerian sentiment can be explained by the fact that by the end of the 1970s, behaviourism was once more out of fashion. Thus, criticising it may have represented an acceptable form of educational rebellion for second-generation innovators at McMaster. So how to account for the omnipresence of Mager at McMaster? Despite the recognized incompatibility of some of McMaster's objectives with behaviourism, it seems that some of McMaster's founders were prepared to quantify the unquantifiable, to make the round peg of McMaster's philosophy fit in the square hole of behavioural objectives. A clue to unravelling this historical syncope can be found in an interview conducted by Geoff Norman with a group of the founding members of McMaster's faculty, in which the issue of Mager was brought up:

C.B. Mueller: And then we got stuck with the book by Mager.

G.R. Norman: ...Learning Objectives...

C.B. Mueller: And that was troublesome to me because it certainly wasn't easy to prepare those. Because if the teacher begins to prepare them, the educator begins to prepare them, then the educator determines what the learner will learn. And we're back to the old system. But nevertheless, to me, that was the philosophy in the beginning.³⁸³

The 'Dr. Mueller' in this interview is the same 'Dr. Mueller' who tried to quantify 'creativity' and 'personal stability' in 1968. Yet the use of the word 'philosophy' in this excerpt is troubling, because the archival evidence does not seem to elevate behaviourist objectives to a 'philosophy' – there is no passionate defence of behaviourism to be found anywhere in the archives, nor is there any sort of statement on the merits and purpose of behaviourist objectives. They are just there, as an educational *fait accompli*. And this is historically puzzling.

Given the limited evidence, we must propose a theory, as follows: Mager and the behaviourists were very much in vogue in the sixties in all branches of education, to the point of being accepted as standard practice by teachers from all fields and at all levels. Aside from the five Founding Fathers of McMaster, most of the other people who were there at the beginning of McMaster's programme were not involved enough in definition of its education philosophy that they would have mounted a counter-attack against 'programmed learning'. The Founding Fathers (Jim Anderson aside) being silent on the subject, and by force of 'being in vogue', behaviourism pervaded throughout the echelons of the McMaster programme management, co-existing in a strange arranged marriage with the distinctively Rogerian approach held by the five Founding Fathers. The oddness of this arrangement only became apparent once the behaviourist fad passed in the 1970s, and the McMaster programme was reformed.

In this section, we have shown that the Founding Fathers only seldom made reference to intellectual sources of inspiration. The most commonly accepted thinker seems to have been Abraham Flexner, whose report from 1910 was cited in the EC and by John Evans. We have

³⁸² Unknown, 'The Objectives Handbook - Draft - April 1979'. Draft report from 1979. Educational Programme Committee - 1979 - HHS/ FHS Archives, Box 233.8;3. McMaster University, Hamilton, Ontario, 4.

³⁸³ Edward J. Moran Campbell, et al. 'Founding Fathers Interview'. Interviewed by G.R. Norman (McMaster University, Hamilton, Ontario 2003), 3.

also found that Comenius and his Renaissance ideas on education was very influential on the thinking of Bill Spaulding, although he was mentioned by no other members of the EC. Indirectly, it seems the McMaster programme was influenced by the writings of John Dewey. Though we cannot say for certain that the Founders read his work, the programme did bear many of the marks of Dewey's problem-method laid out in *How we Think*. Finally, the McMaster programme was influenced the contradictory pressures of behaviourist and humanist psychology of education, with humanist psychology eventually coming through more strongly thanks to Jim Anderson. Now that we have expunged the intellectual influences on the McMaster programme, we will look at the influences on the programme in the practice of education in North America and Europe around the time McMaster was built-up. We will begin with the Harvard Case Method, then will follow with Western Reserve University's reformed programme in medical education, and finally close on the Oxbridge Tutorial system from the UK.

Learning by Example: Practice-based Influences on McMaster

In the previous section of this chapter, we have shown that the evidence for intellectual or philosophical influences for the founding philosophy of McMaster School of Medicine is at best sparse. However, in this next section, we will attempt to show that the Founding Fathers of McMaster built upon existing innovations in education, both medical and otherwise. Firstly, and most oft cited, the Harvard Case Method – we have already seen a potential connection between PBL and the Case Method through the Flexner report, but we shall attempt to deconstruct this connection further. Secondly, and less well known, is the series of visits to various best-practice schools in North America by the founding Education Committee, which Evans commissioned in 1967. As we shall see, not much came of these visits except for a thorough desire to do things differently at McMaster! However, we shall dwell on the Western Reserve University School of Medicine's programme, since, of all the schools visited, it most distinctively caught the attention of the Founding Fathers.³⁸⁴ Finally, some attention will be given to the Oxbridge tutorial system, although its influence was felt a little later.

The Harvard Case Method

In 1982, Schmidt cited the Harvard Case Method as one of the precursors to the problem-based approach,³⁸⁵ although he did not make any explicit connection between McMaster's medical programme and Harvard's business education methods. In this section, we will show how the Case Method was relevant as an influence at McMaster, then we shall explain what the case method was, how it developed, and in what way it was different to PBL.

³⁸⁴ As admitted by Spaulding in 1978, 'McAuley, McMaster Oral History - Dr. W.B. Spaulding', 26.

³⁸⁵ Henk G. Schmidt, *Activatie van voorkennis, intrinsieke motivatie en de verwerking van tekst* [Activation of prior knowledge, intrinsic motivation and text processing], Doctoral Dissertation (Apeldoorn, Netherlands: Van Walraven, 1982), 12-13.

The absence of any reference to the Case Method in the available archival evidence at McMaster tends to suggest that a hypothetical link between the former and the latter would be implicit. However, we do have several references to the potential influence of the Case Method on McMaster from oral history evidence. Ralph Bloch, a former student at McMaster, proposed a theory according to which John Evans would have serendipitously stumbled upon the Case Method during a business trip in the mid-sixties:

But really, and I have that from John Evans himself, John Evans, when he was asked to be the Dean of this new medical school, that would have been about 66 or 67, had no idea about educational theory. So one day, he was travelling between Boston, where he visited various medical schools, and Toronto, and he sat beside a professor of economics who told him – he was at Harvard Business School – they were using what they called “The Case Method” and that’s when it sparked in John Evans’ mind that the Case Method, he could adapt the Case Method to medical education.³⁸⁶

However, Mueller would have disagreed with this statement, as indicated by a comment he made on the subject in 2003: ‘John didn’t have the idea, that wasn’t a John Evans idea. John Evans had Bill Spaulding’.³⁸⁷ Indeed, the majority of the interviewees who spoke on the subject seem to agree that the Harvard connection came from Bill Spaulding – a topic that was discussed in good measure during the 2003 round table discussion on the founding philosophy of McMaster:

G.R. Norman: Where did the notion of learning around problems come from? Any insight into that one? Barb?

C.B. Mueller: I think that came from Bill Spaulding. And I think that came from a trip Bill Spaulding made to Boston, Massachusetts to the Harvard Business School case study. And that’s fixed in my mind, and if you say it’s different, I’ll argue with you.

A. Adsett: There had been a tradition of that in epidemiology. Some of it came out of the Buffalo school, some of it came out of the Harvard School [...] and Harvard gave a course to a bunch of us.³⁸⁸

In particular, Geoffrey Norman recalls hearing confirmation of this from Bill Spaulding in person during a trip from Toronto to Hamilton:

Bill Spaulding and I were driving back from Toronto once fifteen years ago in his 1978 Honda Accord coloured blue, we were about Port Credit or Oakville and I said Bill where did this idea of problems come from, what is it? Well, I have this [unintelligible] and this fraternity brother at Western who went down to the Harvard Business School and they had here this case study method, and that’s where it came from.³⁸⁹

In support of Mueller and Norman’s assertions, Spaulding actually published the reference to Harvard himself in his book from 1991.³⁹⁰ This does not exclude the Evans theory, but it lends strength to the Spaulding lead. Either way, the link between McMaster and Harvard seems plausible.

These remarks are the only explicit historical references we have found to support the influence of Harvard on the conception of the McMaster programme. However, there is such a strong *a priori* correlation between the Case Method and Problem-based learning that the nature of this

³⁸⁶ Bloch, in interview with the author, October 23, 2013.

³⁸⁷ Campbell et al. ‘Founding Fathers Interview’, 33.

³⁸⁸ Campbell et al. ‘Founding Fathers Interview’, 32.

³⁸⁹ Campbell et al., ‘Founding Fathers Interview’, 33.

³⁹⁰ Spaulding, *Revitalizing Medical Education*, ch. 6.

potential connection warrants investigation regardless. As we have seen, Flexner already considered the Case Method to be an interesting model for medical education in his report from 1910. What is somewhat surprising is that Flexner did not pick up on the fact that the Case Method *was* also being used at Harvard Medical School as early as 1900, as we shall see. Although this fact was lost on Flexner, it was certainly not lost on the founders of Western Reserve University School of Medicine, an issue that we shall investigate further on. Suffice to note, for the purposes of this argument, that there might have been two entry points for the influence of the Case Method at McMaster: the Harvard Medical School and the Harvard Business School. The Case Method at Harvard Business School only developed in the 1920s – thus 20 years after medicine, but the difference between them is more than just temporal. Thus, we shall investigate them separately.

Although there were many antecedents, the so-called ‘Case Method’ was founded in 1870 at the Harvard Law School by a pioneering Dean appropriately named Christopher Columbus Langdell, who is said to have acted under the intellectual influence of inductive empiricism to create a learning system for law based entirely on the use of case law.³⁹¹ A comprehensive history of the Case Method can be found in the work of Bruce Kimball and thus further developments on specific developments of the legal Case Method will be withheld here, except to note that Langdell’s invention became the norm in legal education in America, and was adopted by the Harvard School of Medicine in 1900 and by the Business School in 1920.³⁹²

Harvard Business School

It appears that the foremost reason for developing cases in the Business School was to deal with the rapidly changing business environment of the time in a field where there was no readily constituted body of academic literature.³⁹³ Dewing’s description of the purpose of the curriculum also implies that acquiring relevant analytical and problem-solving skills was more important than acquiring knowledge through cases (although this is not entirely consistent with other accounts by his contemporaries):

Education must afford the training to enable the individual to meet in action the problems arising out of the new situations of an ever-changing environment. Education, accordingly, would consist of acquiring facility to act in the presence of new experience. It asks not how a man may be trained to know, but how a man may be trained to act.³⁹⁴

³⁹¹ David A. Garvin, ‘Making the case’, *Harvard Magazine* 106, no. 1 (2003), 56–65.

³⁹² Bruce A. Kimball, *The inception of modern professional education: CC Langdell, 1826-1906* (Univ of North Carolina Press, 2009); and Bruce A Kimball, *Emergence of case method teaching, 1870s-1990s* (Bloomington, IN: The Poynter Center, Indiana University, 1995).

³⁹³ Primary evidence concerning the Case Method at the Business School consists in a few scattered papers, some of which were collated by Harvard professor Cecil Fraser into a booklet on the Case Method in 1931 (Cecil Fraser, *The Case Method of Instruction: A Related Series of Articles*, 1st ed. (New York & London: McGraw-Hill Book Company Inc., 1931), whilst Bruce Kimball’s history of the Case Method provides us with the most extensive secondary source material on the subject.

³⁹⁴ Arthur S. Dewing, ‘An Introduction to the Use of Cases’. In *The Case Method of Instruction: A Related Series of Articles*, 1st ed, ed. Cecil Fraser (New York & London: McGraw-Hill Book Company Inc. 1931), 3.

In addition, cases seem to have served a secondary purpose of increasing interest and motivation in students, who, it was thought, would enjoy their role as active participants in their education far more than the passivity required by lectures:

The distinguishing characteristic which makes the case system of teaching law, in the hands of a competent instructor, an instrument of great power is the fact that it arouses the interest of the student through its realistic flavor and then makes him, under the guidance of the instructor, an active rather than a passive participant in the instruction.³⁹⁵

Beyond general principles, it is important to understand how these ideas panned out in practice. In his chapter entitled *The Use of Cases in the Classroom*, Fraser presents four different ways in which cases were used concretely at the Harvard Business School.³⁹⁶ The four uses of cases naturally have divergent pedagogical implications, best summarized in the following table:

The Harvard Business School Use of Cases			
Use	Description	Pedagogical schema	Order
<i>As illustrative material</i>	For young students, when lectures and standard texts are desirable, cases serve to illustrate the point.	Lecture => Case	General knowledge used for specific application
<i>As a basis for general discussion</i>	Students have to develop solutions to the problems themselves. Prompted by an instructor who asks questions.	Instructor questions => Problem => Student discussions	Specific application allows to move to general knowledge
<i>As a basis for specific questions and answers</i>	Instructor targets specific students with specific questions	Instructor questions => 1 student answers	Order depends on instructor and questions
<i>As a basis for detailed cross-examination</i>	Instructor prepares a question with two possible answers, then sub-questions related to both answers. Then encourage other students to provide reasoning for answer and draw out general principles.	Instructor questions, then 1 student answers, followed by a general class discussion	Specific application allows to move to general knowledge

Table 9: The use of cases at Harvard Business School circa 1931

As we can see, only the first use explicitly mentions lectures. The implication from the text is that lectures are not generally desirable, except in the case of ‘inexperienced’ and ‘immature’ students.³⁹⁷ Thus, only the first configuration utilizes a deductive form of reasoning: general principles are outlined first in a lecture, and students are expected to crystalize their ideas about these principles using specific cases. The other three configurations of cases imply induction: students, through more or less guided discussion, should induce general principles from the starting point of a specific case. This inductive orientation makes sense given the Law School antecedents of the Case Method in Business. Fraser cites the fourth configuration as the most

³⁹⁵ Wallace B. Donham, ‘Business Teaching by the Case System’. In *The Case Method of Instruction: A Related Series of Articles*, 1st ed., ed. Cecil Fraser (New York & London: McGraw-Hill Book Company Inc. 1931), 14.

³⁹⁶ Cecil Fraser, ‘The Use of Cases in the Classroom’. In *The Case Method of Instruction: A Related Series of Articles*, 1st ed., ed. Cecil Fraser (New York & London: McGraw-Hill Book Company Inc. 1931), 36-38.

³⁹⁷ Fraser, ‘The Use of Cases’, 36.

commonly used, given, he says, that “it not only forces the student to make a thorough and practical analysis and to substantiate both the method and results of that analysis under cross-examination, but to separate from a large amount of detail the important principles on which the theory of business must be developed”.³⁹⁸ This interpretation of the Case Method is supported by a comment made by Copeland:

The primary purpose of a case system of instruction in business education is to develop conclusions of general significance from an analysis of concrete situations. [...] If the case is to be utilized to full advantage, the cases should be arranged to build up the theory of the subject inductively, step by step. Each case or group of cases should serve to bring out a particular point or series of points of general significance by means of analysis, comparison, and contrast.³⁹⁹

Thus, it appears that the primary function of the case method is not, as might first appear, to apply knowledge acquired in lectures, but instead, ‘to acquire a broad acquaintance with both technical and general information about diverse fields of industry, not by the study of dissociated facts but as an incident in the intellectual process of working out decisions’.⁴⁰⁰ Vanderblue and Gragg further develop this point in their chapter on *The Case Method of Teaching Economics*, in which they state:

Sharply in contrast with the illustrative use of cases is the method of presenting cases *without* a simultaneous statement of the principles inherent in the facts of the cases. This method requires that the student himself analyse the case facts and indicate the conclusions of general significance. [...] The student must not be allowed to find the “answer” immediately available but must be led by discussion to work out a tenable opinion of his own. The student must understand the facts of the case and then perform for himself the task of inducing from them one or more principles. His text-book provides a guide, but it does not tell the whole story.⁴⁰¹

In this model, lectures are no longer used as a means of transmitting knowledge, as outlined by Donham: ‘this classroom discussion largely or wholly displaces the lecture as a medium for the presentation of principles’.⁴⁰² This finding has quite some implications, because it invalidates the proposition that McMaster was the first school to place a problem as the trigger for learning. In order to clarify this point, we would do well to look at the structure of a case.

We do not have access to an original case from the Business School, but we do have a case specification, which is designed to help course instructors write their cases, and may be even more revealing than the former:⁴⁰³

³⁹⁸ Fraser, ‘The Use of Cases’, 38.

³⁹⁹ Melvin T. Copeland, ‘The Development of Principles by the Use of Cases.’ In *The Case Method of Instruction: A Related Series of Articles*, 1st ed., ed. Cecil Fraser (New York & London: McGraw-Hill Book Company Inc. 1931), 26-30.

⁴⁰⁰ Donham, ‘Business Teaching’, 18.

⁴⁰¹ Homer B. Vanderblue and Charles I. Gragg, ‘The Case Method of Teaching Economics.’ In *The Case Method of Instruction: A Related Series of Articles*, 1st ed., ed. Cecil Fraser (New York & London: McGraw-Hill Book Company Inc. 1931), 113-114.

⁴⁰² Wallace B. Donham, ‘Business teaching by the case system.’ *The American Economic Review* 12, no. 1 (1922), 57.

⁴⁰³ Malcolm P. McNair, ‘The Collection of Cases’. In *The Case Method of Instruction: A Related Series of Articles*, 1st ed., ed. Cecil Fraser (New York & London: McGraw-Hill Book Company Inc. 1931), 145-146.

Example of a case specification at Harvard Business School	
Issue	Whether a variety chain or dry goods chain should operate one or more warehouses or whether it should have good shipped directly to its stores by vendors.
Background	Describe company as to type, merchandise, number of stores, geographical distribution, and operating results. Describe methods of purchasing merchandise, especially in connection with securing shipments to warehouses or to stores directly. What experience has company had in securing price concessions on advance orders, and to what extent must it bear carrying charges on such orders if made in advance? Describe methods of controlling store inventories, orders, reorders, new merchandise. Explain price policy and method of fixing retail prices: that is, whether by store manager, superintendents, or central office. Give methods of accounting for merchandise, sales, mark-downs, short-ages, and returns; and show how the case would bear on these factors. Are vendors willing to give quantity or other discounts on orders which have to be shipped to individual stores? Could deliveries be made more effectively and under better control by company's warehouse, or by vendors? Are some lots of merchandise bough from a number of vendors, or does each vendor supply the entire requirements? The questions of prompt delivery, adequate store control, merchandise accounting, and control of store operations seem to be the chief ones to be covered in this case. In addition, costs of warehousing and reshipments are important. Find out whether stores have sufficient capacity to care for direct shipments.
Possible sources	W.T. Grant Company, J.C. Penney Company

This description of a case specification raises several points of interest. Firstly, the case in question is clearly based on a real company and its lived situation, as indicated by the provision of potential sources for the material. Secondly, we find a list of detailed questions, but it is unclear whether these are questions that the course instructor should be asking the company in order to write his case, or whether these are questions that the instructor should ask the students. Given the context of the text, the former seems more likely, but it might be both. Thirdly, this specification implies that the instructor already knows which principles he intends for the student to induce – in this case: ‘the questions of prompt delivery, adequate store control, merchandise accounting, and control of store operations’ seem to be the most important points. But this specification only gives us a partial understanding of the nature of cases. Fortunately, McNair goes on to describe the presentation of business cases more in depth:

No one best formula has been evolved for the presentation of a business case. One fairly common type of case begins with a succinct statement of the type of concern involved and the particular issue faced; follows this with a brief statement of the immediate circumstances leading up to the emergence of the issue; goes on to a description of the general background of the concern, the nature of its products, markets served, channels of distribution, size of company, organization, corporate and financial structure, and the like; presents a fairly detailed statement of the pertinent facts and reasons bearing on the particular issue; and ends with a statement of the company's decision or, if a decision has not been reached, with a question as to what the decision should be. The term “cases” is used to denote a case where the decision is stated, while “problem” is used to denote a case which ends with a question rather than a statement of the company's decision. Although the tendency at the outset was to use “problems” almost exclusively for teaching purposes, experience indicates that for most pedagogical purposes, “cases” are equally useful.⁴⁰⁴

⁴⁰⁴ McNair, ‘The Collection of Cases’, 154.

As well as confirming that general principles are *not* given in the case and must thus be worked out by students, this case description by McNair clearly indicates that the Business School faculty were already thinking in differentiated terms between ‘problems’ and ‘cases’. The distinction is all the more interesting that it ties into the historical argument made by Bruce Kimball – he bisected the Case Method into two distinct categories: the method by analogy, and the method by problems.⁴⁰⁵ The method by analogy, he argued, forced law students to reason analogically with principles and rules when being presented cases with similar features. This was particularly suited to the development of legal reasoning, given a relatively fixed and defined body of relevant knowledge. The method by problems, by contrast was oriented toward a more experiential, process-driven, problem-solving form of education, explicitly influenced by Dewey and the ‘problem-method’.⁴⁰⁶

The implication of the above 1931 text – that problems formed the core of the material presented at the outset of the Business School’s use of the Case Method – confirms Kimball’s claims. It also echoes the use of unsolved patient cases as problem triggers at McMaster University. However, there does not appear to be a dogmatic dedication to the problem method, since the use of resolved cases was introduced and found to be ‘equally useful’ – useful for what? That is an interesting question, because it cannot be ‘for problem-solving’, if the solution is presented with the material. It seems that the Business School may have been flirting with analogous reasoning too.

Was the problem-method, to the extent that it was used in the Business Case Method, identical to McMaster’s Problem-based learning? The answer hangs on the *order* in which the material was presented. Indeed, what the evidence presented above does not tell us is whether classroom discussion *preceded* self-study, or vice-versa. We know that McMaster presented problems *before* allowing students to delve into self-study – so we must establish which of the two educational scenarios was most likely played out at Harvard. There are no indications on the topic in the collection of essays compiled by Fraser. However, a short paper clearly written either just prior or during to the adoption of the Case Method in the Business School gives us the surest hint: ‘[business] cases when collected and arranged should be printed in case books or be otherwise made available to the student for his consideration and discussion prior to the classroom exercise at which they are used’.⁴⁰⁷ The implication here is clearly that students are required to prepare the case or problem on their own before coming to class discussion with their notes. Thus, it can be said that in this, Harvard diverged significantly from McMaster – as the key feature of McMaster’s programme was the inclusion of a problem discussion phase during which students conversed around an unknown problem prior to their self-study.

Harvard School of Medicine

The Case Method is so profoundly associated with the Business School that it is often forgotten that its adoption by Harvard’s School of Medicine antedated that by the Business School by over

⁴⁰⁵ Kimball, ‘The inception of modern professional education’.

⁴⁰⁶ Kimball, ‘The inception of modern professional education’, 12. See also previous section on John Dewey.

⁴⁰⁷ Donham, ‘Business teaching by the case system’, 59.

twenty years. Indeed, it has been erroneously stated that the School of Medicine did not adopt ‘cases’ until 1985⁴⁰⁸ – but this date marks the School’s adoption of the New Pathway Curriculum, which was a hybrid adaptation of McMaster’s Problem-based model rather than the original Harvard Case Method. In fact, as noted by Greer Williams, the Case Method was introduced at Harvard Medical School by Walter Cannon, young up-and-coming basic scientist, in 1900.⁴⁰⁹ Perhaps the disappearance of Harvard Medical School’s experiment with cases from collective memory can be explained by the fact that it fell out of use some time in the 1920s. As Kimball notes: ‘by 1920, it appears that no more medical casebooks were being published. The extinction was so complete that the recent, standard histories of medical education make no mention of case method teaching’.⁴¹⁰

However, we know of the early experiments with the case method in medicine since Cannon published a paper in the *Boston Medical and Surgical Journal* in 1900, which details his method, its purpose and provides examples of cases for the reader. This invaluable piece of evidence supplies us with insights into the method and its underlying philosophy. Cannon opens his paper with a long tirade against didactic lectures and recitations, citing them as inefficient, ephemeral and generally disconnected from the practice of medicine.⁴¹¹ It is unambiguously clear from the text that lectures were not included in the proposed system. Indeed, Cannon notes: ‘it is supposed that their only preparation is a previous study of the scientific groundwork – anatomy, physiology, pathology and therapeutics – and that they have heard no lectures on the practice of medicine’.⁴¹² The ‘previous study’ that Cannon refers to indicates the peculiarity of the American medical education system whereby students first study an undergraduate degree at college and then enter medical school. It is clear that he expects that students will require prior knowledge in relevant background fields of study prior to using the Case Method, even if he discredits lectures in the study of medicine *per se*. The second element of the method that comes through from the text is the order of study: first, students must deconstruct and analyse the case on their own, using whatever resources they can find, and then only do they gather in a group and in the presence of their instructor to discuss their findings:

Now, the intent of the proposed case system is, in short, to give the students printed data from actual histories. These data are then to be studied and analysed by the students, who shall be required to consider in every detail the differential diagnosis, the principles of prognosis in the case, and the rational treatment. The students, after having studied the case, shall come to a conference with the instructor, in which all the points in a particular problem shall be discussed. Such in outline is the scheme of study.⁴¹³

⁴⁰⁸ For instance, this is the assumption made by David Garvin in: Garvin, ‘Making the case’, 56–65.

⁴⁰⁹ Greer Williams, *Western Reserve’s experiment in medical education and its outcome*, 1st ed. (New York: Oxford University Press, 1980), 60–61.

⁴¹⁰ Kimball, ‘The inception of modern professional education’, 10.

⁴¹¹ Cannon, ‘The Case Method of Teaching’, 31.

⁴¹² Cannon, ‘The Case Method of Teaching’, 33.

⁴¹³ Cannon, ‘The Case Method of Teaching’, 31–36.

The students are expected to behave like quasi-professionals, and the instructors to lead the students using the Socratic Method of old, that is, using questions and answers:⁴¹⁴

The conference consists of a discussion of all the aspects of a given case or a set of cases, under the direction of an instructor, who makes suggestions or expresses his own opinions as they seem necessary. The conference is a real conference because all participants come to it with considerable knowledge of the subject already secured.⁴¹⁵

Looking at a case from the Harvard Medical School, which Cannon is so kind as to provide us with, it seems that there is not much difference with the cases that were provided to McMaster students, as we shall see later. Suffice to note for now that any difference in method lies neither in the nature of the problems, nor in the preponderance (or lack thereof) of lectures.

Example of a Case at Harvard Medical School⁴¹⁶

A boy of seven years had no noteworthy illness until, at five years of age, he had scarlet fever, with acute nephritis in complication. He was seen six months before the present illness, when he had grippe, with acute middle ear. His general condition has been fairly good since. The present illness began with vomiting and high temperature, 104°F. He was seen by a consultant two days later. During these two days, he had grown worse. The temperature had remained above 104°F. The vomiting had continued at intervals, but was not so severe or frequent at first. He had become apathetic but complained of pain when handled. The bowels were constipated. The tongue was coated. At the examination on the third day of the illness he was found fairly developed and nourished. Though somnolent, he could be roused and he cried out when handled. There was no retraction or rigidity of the head. The pupils were equal and retracted normally. The face was flushed. The breathing was rapid and superficial. The pulse was strong and rapid. Nothing was detected in the lungs except diminished vesicular respiration in both backs below the scapulae. The cardiac impulse was felt in the fourth space just inside the right mammary line. It was somewhat increased in strength, the heart sound was not accentuated, there was no impulse felt to the left of the sternum or in the epigastrium. The abdominal muscles were so tense that palpitation was impossible, not from any localized tenderness but apparently from all over the abdomen. Rectal examination was negative. Urine was negative. Opiates were required to relieve pain. There had been no vomiting for twelve hours. A large movement of the bowels followed the administration of calomel on the previous day.

Thus, on the basis of the evidence here presented, we may conclude that the use of problems as triggers for accessing general principles and knowledge does indeed pre-date McMaster's Problem-based learning programme, and could already be found at Harvard Medical School in 1900 and at Harvard Business School in the 1920s and 1930s. However, these triggers were likely not used in the same way as McMaster, since students at Harvard were called upon to read up and study the cases before the class. Therein lies a major difference, which not only demarcates Harvard Business School from McMaster, but also demarcates the Case Method from problem-based learning. We shall delve further into the matter later in this treatise.

North American Medical Schools

In the spring of 1967, less than one year after drafting his founding memorandum, John Evans sent his core team of the Education Committee to the four corners of North America to seek

⁴¹⁴ Although the words 'Socratic Method' are not used by Cannon, they are used several times to refer to the Case Method by Wallace Donham (see Donham, 'Business teaching' and Donham, 'Business teaching by the case method') and David Garvin (see Garvin, 'Making the case').

⁴¹⁵ Cannon, 'The Case Method', 33.

⁴¹⁶ Ibid, 34.

out the best and most creative advances in medical education.⁴¹⁷ For a few months, Spaulding, Anderson, Walsh and Mustard toured the USA and Canada in search of inspiration for their own school, both by visiting other medical schools and attending conferences on medical education. The minutes of the Education Committee of the 22nd December 1967 suggest that, among others, the Founding Fathers visited Northwestern University, the University of Southern California, and the University of California at San Diego.⁴¹⁸ Other pieces of archival evidence indicate that they also visited Oral Robert University and Western Reserve University School of Medicine, as we shall see. Some of these journeys are recounted with candour and humour in the form of after-action reports drafted by the Education Committee members. Spaulding recalled in an interview recorded in 1978 that this visit catalysed his founding document of 1968:

Early on, we went on a trip to a variety of medical schools going from La Jolla to the Mid-West. After that trip, I can recall writing out a draft of what turned out to be the first set of objectives that appeared in our medical school calendar.⁴¹⁹

It appears, from archival records, that whilst some schools that were visited were making timid progress in terms of pedagogy, the Founding Fathers spent more time learning what *not* to do from these than actually importing ideas wholesale, as illustrated by Jim Anderson's reflection on the matter:

We thought we should maybe travel around and look at innovative schools, and I think this was mostly relatively depressing because you would read about a programme and it sounded exciting but when you would go there, you would find it was really the old programme just reshuffled a little bit.⁴²⁰

In particular, Anderson recalled with humour a visit to Oral Roberts University in Oklahoma, at which he and Spaulding were hoping to uncover the first random-access computerized audio-visual retrieval system:

They had no software, virtually, other than a few films on Oral Roberts television shows and you would sit in a carrel and look at the catalogue and you would dial access; however, behind the glass there was a little old lady in sneakers who says: "oops, they want number 17" and would go to a shelf and pull out the film and put it on the machine and plus in the telecine and you would get it in your booth. As far as I could tell, all the computer did was light up and say: "there is some slob down here that wants film number 17", and so it was not really a dial access.⁴²¹

It cannot be said that any of these schools left a lasting impression on the Founding Fathers, save one – in May 1967, Bill Spaulding paid Western Reserve University School of Medicine

⁴¹⁷ His intention to do so was highlighted in the note he wrote in 1967: John Evans, 'Confidential (Accreditation Visit)'. Undated handwritten notes. Accreditation Preparation Visit - HHS/FHS Archives, Box 144.2;1. McMaster University, Hamilton, Ontario. The note itself is undated but it was grouped by the archivist with a series of notes and correspondence of John Evans dating from 1967.

⁴¹⁸ William B. Spaulding, 'Educational Programme Committee Meeting - Minutes, December 22, 1967'. Minutes from 1967. Educational Programme Committee - 1966-1967 - HHS/ FHS Archives, Box 232.4;3. McMaster University, Hamilton, Ontario.

⁴¹⁹ McAuley, 'McMaster Oral History - Dr. W.B. Spaulding', 26.

⁴²⁰ McAuley, 'McMaster Oral History - Dr. J.E. Anderson', 12

⁴²¹ McAuley, 'McMaster Oral History - Dr. J.E. Anderson' 13.

(located in Cleveland, Ohio) a visit and reported at length on what he saw to the rest of the Education Committee.⁴²²

Western Reserve University School of Medicine (WRU)

In 1952, Western Reserve overhauled its curriculum, a move that was still being hailed in the 1980s as ‘more far-reaching and longer lasting’ than any other at the time.⁴²³ Greer Williams chronicled the history of Western Reserve University’s medical reform in 1980 much in same way that Bill Spaulding recorded the history of McMaster University.⁴²⁴ Of particular background interest is the connection between Western Reserve University and Harvard School of Medicine. Indeed, both the reforming Dean of WRU, Joseph Wearn, and his most influential reformer, Dr. T. Hale Ham, were Harvard educated. Wearn had grown at Harvard under the tutelage of Prof. Peabody, a ‘humanist’ physician whose educational methods were very much in the tradition of Walter Cannon.⁴²⁵ As for Ham, he personally ran a course in Laboratory Examinations in Clinical Diagnosis at Harvard Medical School, which built on the Cannon’s Case Method:

Each student was handed summaries of the case selected, identifying the patient, chief complaint, his appearance as informant, present illness, family history, past medical history, physical examination, behavior examinations, laboratory examinations and hospital course. The students were then assembled in the laboratory in groups of ten. The patients were brought in to provide specimens of blood, urine, stool, and sometimes gastric juice. The protocols omitted all laboratory data, so that it was up to the students to perform indicated tests on the patients assigned them and to report on the results, including statistical analysis and clinical significance.⁴²⁶

Although Western Reserve ran its medical education experiment almost two decades before McMaster, one might say that in their objectives, these were kindred programmes. Indeed, if we go by the objectives of WRU as noted by Robert Ebert in 1980, then the humanist, society-oriented, interdisciplinary, anti-traditionalist stance of McMaster was very much in line with that of the former:

Objectives of WRU School of Medicine⁴²⁷

1. It is impossible to learn everything there is to know in medicine. Therefore, some selections must be made and this is the responsibility of the faculty at large.
2. The curriculum should be designed as a logical continuum by the faculty as a whole and not by departments

⁴²² William B. Spaulding, ‘Visit to Western University School of Medicine, May 15th and 16th, 1967’. Report from 1967. Educational Programme Committee - 1966-1967 - HHS/ FHS Archives, Box 232.4;1. McMaster University, Hamilton, Ontario.

⁴²³ Patricia L. Kendall and George G. Reader, ‘Innovations in medical education of the 1950s contrasted with those of the 1970s and 1980s.’ *Journal of Health and Social Behavior* 29, no. 4 (1988): 279–293.

⁴²⁴ Greer Williams, *Western Reserve’s Experiment in Medical Education and Its Outcomes* (New York: Oxford University Press, 1980).

⁴²⁵ Williams, *Western Reserve’s Experiment*, 15-17.

⁴²⁶ Williams, *Western Reserve’s Experiment*, 62-63.

⁴²⁷ Williams, *Western Reserve’s Experiment*, vii.

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3. Teaching should be interdisciplinary since medical knowledge is derivative and depends on many disciplines. Disciplinary teaching, both clinical and preclinical, tends to hinder the integration of medical knowledge and causes the student to compartmentalize his/ her thinking.
4. The medical school curriculum should not be sharply divided between pre-clinical sciences and clinical medicine. Rather, there should always be a mix, gradually changing from one with a major emphasis on basic medical science to one with major emphasis on clinical medicine.
5. The product of this educational experience should be an undifferentiated physician educated to think scientifically, but imbued with a humane concern for the individual patient. All physicians, whether they intend to become surgeons or family physicians, should have the same basic medical education before they specialize.

The last objective on this list was of particular concern to McMaster, and it is interesting to note that Spaulding paid close attention to it when he visited WRU in 1967. By his account, he felt that in this regard WRU's programme had not gone as far as it could have:

Obviously, the school has not succeeded in developing a very effective community and family medical programme. They had good intentions but when we asked about this we were told repeatedly of their well-known programme, which has been carried out since the inception of the curriculum change [...] We found little support for the idea of training a new type of family physician, although one or two of the faculty felt this was the answer.⁴²⁸

As we have seen, this was something that McMaster was keen to push further on its programme's agenda. In terms of its actual programme structure, Western Reserve worked through the problem of interdisciplinarity through the use of 'subject committees' that broke the curriculum down into what ended up being systems-based courses. Therefore, the systems approach pre-dated McMaster – and indeed, Spaulding credited WRU with the inspiration for its own systems-based units, when he admitted in 1978: 'we also liked the Western Reserve idea of teaching by body systems such as cardiorespiratory and so on. So that's where Phase III came from'.⁴²⁹

Subject Committees 1952-1953	Subject Committees 1953-1954
<ol style="list-style-type: none"> 1. Introduction to cell biology 2. Cellular energy 3. Cellular structure 4. Cell growth and development 5. Locomotion 6. Nervous system 7. Blood, capillaries and lymphatics 8. Respiratory system 9. Heart and large blood vessels 10. Digestive system 11. Liver 12. Endocrine systems 13. Kidney 14. Reproductive systems 	<ol style="list-style-type: none"> 1. Cell biology 2. Tissue biology and neuromuscular systems 3. Cardiovascular and respiratory systems 4. Metabolic, gastrointestinal and renal systems 5. Endocrine and reproductive systems.

Table 10: Subject Committees 1952-1954 at WRU⁴³⁰

⁴²⁸ Spaulding, 'Visit to Western University School of Medicine', 3.

⁴²⁹ McAuley, 'McMaster Oral History - Dr. W.B. Spaulding', 22.

⁴³⁰ Williams, *Western Reserve's Experiment*, 143.

REVOLUTIONS & RE-ITERATIONS

Despite the attractive layout of the curriculum on paper, Spaulding felt, from his brief observation, that the integration of these committees with the broader programme committees was not successful, leading to a somewhat disjointed programme at WRU:

Three different committees were responsible for the three major phases of the course. There was minimal communication and effective liaison between these committees and this was a major consideration of the newly formed group authorized to recommend major revision.⁴³¹

There were a few other elements of the curriculum which were quite novel at the time of their inception. Firstly, WRU allocated time for student projects, which would usually be run in conjunction with ‘tutors’ during students’ free time:

It was a sound idea, time-tested, a sort of short-order doctoral thesis. The student could work on his project in free time, but one day a week for sixteen weeks was scheduled for this purpose toward the end of the second semester. It could be laboratory, clinical, or library, or indeed anything acceptable to the committee in the problem to be pursued. Necessarily, it had to be limited in scope and methodology.⁴³²

However, these projects were not generally problem-oriented. In fact, although most appreciated the experience, many students complained that they were being treated as lab assistants or technicians during their projects.⁴³³ Secondly, the idea of ‘free time’ for students was institutionalised and integrated into the curriculum, reminiscent of McMaster’s generous self-study time. But a closer look at the allocation of working hours in the programme reveals that in fact, basic science lectures occupied the chief portion of students’ time.

1st Year Allocation of Working Hours (Students – Total 34.5 weeks)	
Student orientation	20 hours
Basic science subject committees	682 hours
Clinical science section	97 hours
Biostatistics	35 hours
Library science	7 hours
Research projects	231 hours (student estimate)
Free time	352 hours
Review week	36 hours
Examinations	56 hours
Total	1516 hours

Table 11: First Year allocation of working hours at WRU⁴³⁴

In terms of examinations, WRU did not do much to push the envelope. Although there was some discussion on the nature of examinations, ultimately, a comprehensive examination system was maintained using interim and comprehensive exams, although some exams were made curiously voluntary.⁴³⁵ Dr. Ham, the Harvard educator and founding father of the WRU programme, is reported to have been quite disappointed by this failure:

Dr. T Hale Ham, who played a key role in organizing and carrying out the new curriculum summarized the opinion about their success in evaluation very quickly. He said the results had been disappointing. He felt that evaluation was in much the same stage as medical science a hundred years ago.⁴³⁶

⁴³¹ Spaulding, ‘Visit to Western University School of Medicine’, 2.

⁴³² Williams, *Western Reserve’s Experiment*, 174-175.

⁴³³ Williams, *Western Reserve’s Experiment*, 176.

⁴³⁴ Williams, *Western Reserve’s Experiment*, 140.

⁴³⁵ Williams, *Western Reserve’s Experiment*, 179.

⁴³⁶ Spaulding, ‘Visit to Western University School of Medicine’, 1.

Thus, we can conclude that although Western Reserve's programme definitely inspired some thoughts about the McMaster programme, there was quite a stretch from the 1952 WRU curriculum to McMaster's own programme from 1969. Much the same could be said about all of the schools that Spaulding and co. visited. They picked items of interest here in there, thought of what they could do better, and brought it to the table of the Education Committee. If anything, it could be argued that McMaster's programme was closer to the original Case Method devised by Walter Cannon in 1900 than to any of the so-called 'innovative' programmes of the 1950s and 1960s. That said, not all models of practice for McMaster came from America. Indeed, our analysis of the sources of inspiration for McMaster's curriculum would be incomplete without an explanation of the Oxbridge tutorial system and its influence of the PBL tutorial group. We shall expound this point next.

The Oxbridge Tutorial System

Given that so many of McMaster's founding faculty came from Great Britain, it is hardly surprising that British traditions found their way into McMaster's pedagogical debates.⁴³⁷ Although the academic culture reigning in England's medical schools was referred to more generally by British interviewees, particular mention was made of Oxford and Cambridge, the great guardians of British academic traditions. In particular, the strange Oxbridge contraption known as the 'tutorial' came under much attention. Dr. Mueller stated outright, in a retrospective paper published in 2008, that the tutorial was 'adapted from the English tutorial systems of Oxford and Cambridge'.⁴³⁸ In this section, we shall attempt to determine the extent to which the pedagogical practices Oxford and Cambridge might have helped to shape McMaster's educational philosophy.

In 1969, McMaster hired a British haematologist as a consultant to the Education Committee: Dr. Michael Brain brought with him from the United Kingdom a certain passion for the Oxbridge tutorial, and attempted to introduce the Faculty of McMaster to this idea, as noted by Jim Kraemer in his minutes of the 28th March 1969:

Dr. Brain described the role of the tutor at Uxbridge University (sic) in Britain. He explained that the Uxbridge tutor had very definite education responsibilities and that he often demanded the presentation of assignments on a weekly or by-weekly basis from his students. With this strong education base, the relationship between the tutor and the student often developed into more than a strictly academic one.⁴³⁹

The fact that Oxbridge was confused in the typewritten notes with a hypothetical 'Uxbridge University' (which, as far as can be ascertained, did not exist) does tend to indicate that to North American medical educators, the practices of old-world didactics were somewhat lost in translation. However, the Oxbridge camp, led by Moran Campbell, held a strong voice within the EC, and the discussion about tutorials quickly revolved around the Oxbridge model. Sackett

⁴³⁷ As we have seen, one may think here of Moran Campbell, Kinsey Smith, John Hamilton, but there were also other secondary characters around with British connections, such as Drs. Brain and Dickinson.

⁴³⁸ Mueller, 'McMaster University Medical School', 30.

⁴³⁹ Kraemer, 'Education Committee Meeting - March 28, 1969'.

saw the ideal of the Oxbridge tutorial, as understood and interpreted by Moran Campbell, as consonant with the student-directed stance of McMaster:

Moran Campbell came from Hammersmith, and some of those folks, where they really did do it, and where it was a method of inquiry, where, again, the Oxbridge tutorial, when it was really done, was not about memorizing facts, you know, it was about taking a question or a problem and figuring it out so that it was one of understanding rather than memorization, and so from that point of view, that was great.⁴⁴⁰

Some of the tutors who had experienced the Oxbridge model seem to envision their role and responsibilities in that light, as evidenced by this note from Dr. Dickinson from 1970 concerning his experience with Phase III:

The tutorial relationship evidently worked well in CV Phase III (see students' evaluation questionnaire) and was generally appreciated. From experience of an individual personal tutorial relationship such as I had myself at Oxford, and from experience of problems and possibilities, I believe: [...] the idea tutor knows a lot about his subject; he devises his own problems to set to the students; directs the student's effort to solve them and (in the absence of a formal evaluation system) critically evaluates the student performance.⁴⁴¹

In 1969, Jim Anderson also suggested the inclusion of an 'Oxford style' tutorial in response to students' desire to know better how they were faring during McMaster's assessment-less curriculum:

"Q: Do you feel that you need to know how you are doing at intervals during the course? A: Yes: 15 No: 3 Other: 2"

"In your opinion, what is the best way to find this out? A: There are several ways - Small Group discussion of questions previously handed out; a Barrows or Hamilton Special⁴⁴² followed by a tutorial session; a group of problems à la Branda and Brandstater discussed in tutorial sessions, and Oxford Style tutorial in which one could discuss the week's objective - this would be both evaluation and a learning experience"⁴⁴³

The implication is here that the Oxford tutorial was understood as a potentially effective means of providing feedback to students without the formality of a graded assignment. Given the prevalence of the Oxbridge tutorial model in the discussion at McMaster around 1969, it would be useful to understand the underlying principles of this model and how they might have been of use to McMaster.

The Oxford and Cambridge tutorial model (Oxbridge for short) has been around almost as long as these centenary institutions, although it was loosely understood as a 'godfather' role for some centuries.⁴⁴⁴ The modern educator-pedagogue notion of tutorship crystalized during the

⁴⁴⁰ Sackett, in interview with the author, October 25, 2012

⁴⁴¹ Charles Dickinson, 'Re: Cardiovascular Phase III - To: C.J. Schwartz - July 29, 1970', Report from 1970. Educational Programme Committee - 1970 - HHS / FHS Archives, Box 232.5;8. McMaster University, Hamilton, Ontario.

⁴⁴² Quite puzzled to find the mention of a *Barrows or Hamilton special* without further explanation, I sent the excerpt to John Hamilton, who suggested that a *Hamilton special* "may refer to a test I set up for the Phase 1 GI week consisting of 8 stations exactly along the lines of what was later developed and published by Ronald Harden from Dundee and the origin of OSCA and OSCE". (John Hamilton, *in correspondence with the author*, November 25, 2013)

⁴⁴³ James Anderson, '7. Evaluation - To: Members of the Education Committee - December 30, 1969'. Report from 1969. Educational Programme Committee - 1969 - HHS / FHS Archives, Box 232.5;4. McMaster University, Hamilton, Ontario.

⁴⁴⁴ Will G. Moore, *The tutorial system and its future*, 1st ed. (New York: Pergamon Press, 1968), 2.

nineteenth century, under the influence of the so-called ‘Balliol tutors’ of Balliol College.⁴⁴⁵ It was therefore a well-established institution by the time the debate on the role of ‘tutors’ was raging at McMaster. A book on the subject was fortuitously published in 1968 by Will Moore, which provides us with a happily contemporary perspective on the Oxbridge tutorial.⁴⁴⁶

By Moore’s description, the tutorial process is a dialogue between a tutor and a student that grafts itself onto the classic university curriculum, without replacing any of its original components (such as lectures and seminars):

At its most simple the tutorial is a weekly meeting of the student with the teacher to whom he is specially committed. This does not replace other methods, such as instruction by lecture or in class. It clearly cannot replace private study. Indeed, it assumes all of these, and includes their results in the preparation of a weekly essay, which is presented orally, listened to by the tutor and discussed immediately. The whole process – of reading, discussion, arrangements for the following week – takes up little more than an hour.⁴⁴⁷

In its unfolding, the tutorial is reminiscent of the Socratic Method:

The actual talk is as informal as are the surroundings. It opens with a few questions as to how the student has “got on” with his subject, a brief confession, on his part, perhaps that he liked it better than he expected to, or that he was conscious that he had not covered the ground nor uncovered the real problem within the subject. Then the reading, interrupted at will by the tutor, and at times by the student, followed by perfunctory praise or thanks and the by detailed comments, which the student is free to take down or not as he prefers. This part can either be free interchange or painfully one-sided information. The final minutes are devoted to suggestions and hints about next week’s subject⁴⁴⁸

Moore noted as an addendum to his description that although this could be understood to generally represent the Oxbridge tutorial, tutorials actually vary in length and style, very much depending on the tutor. Although almost all fields make use of the weekly essay, Moore found that some of his natural sciences colleagues preferred to use questioning and probing to get their students to the desired understanding. Moore’s description has obvious implications on the role of teachers in the Oxbridge system:

The tutor is not a teacher in the usual sense: it is not his job to convey information. The student should find for himself the information. The teacher acts as constructive critic, helping him to sort it out, to *try* it out sometimes in the sense of exploring a possible avenue, rejecting one approach in favour of another. The whole process turns around the concept of bias: how you see things, how you evaluate evidence, how you tend to connect one fact with another.⁴⁴⁹

In discussing the origins of the Oxbridge tutorial method, Moore mused on the importance of Rousseau’s naturalist stance - a stance of which we examined the importance in our discussion on Comenius – and more prominently, of Pascal’s scientific scepticism:

Here, I suggest, are the roots of the tutorial method. It is a sceptical method, a method that inquires, probes, scrutinizes. It is not at its best in *ex cathedra* authoritative statement, but in criticism, theory, analysis, comparison. It prefers the relative to the absolute, the tentative to the dogmatic, the essay to the treatise. [...]. A university in which the tutorial method operates is not likely to offer a blueprint for society, to speak with the voice of authority, to fix, determine, assert, sanction, denounce. It is rather a university seeking to be the one place in society where one may ask fundamental questions, where inquiry may

⁴⁴⁵ David Palfreyman, *The Oxford Tutorial: ‘Thanks, you taught me how to think’* (Oxford, UK: Oxford Centre for Higher Education Policy Studies, 2001).

⁴⁴⁶ Moore, *The tutorial system*.

⁴⁴⁷ Moore, *The tutorial system*, 15.

⁴⁴⁸ Moore, *The tutorial system*, 16.

⁴⁴⁹ Moore, *The tutorial system*, 19.

proceed without regard to the consequences, where theory may clash with theory, to be the home of point and counterpoint, of dialectic rather than of dogma.⁴⁵⁰

And yet, it is interesting to note that Moore did not believe the tutorial system to be suitable for the subjects of jurisprudence and anatomy on the grounds that there was too much information to absorb before discussion could commence.⁴⁵¹ This statement is a little odd given that the tutorial method was being applied in medicine – not only at Oxford and Cambridge, but also in all of the major medical schools of London! But Moore was an arts don, which may serve to explain his strange stance on the matter.

In summary, the Oxbridge tutorial model offers of model of education that falls within the Socratic tradition of preceptorship. Its one-on-one format is quite unique to Oxford and Cambridge among British universities, perhaps because only they possess the endowment necessary to support this kind of setup. Given the highly personal nature of the contact between tutor and student, it is no wonder that those members of McMaster faculty who had experienced it were marked by it.

Conclusion: A question of context?

Education philosophy has, since the time of Plato, provided us with such a luxuriant panoply of ideas, thought-systems and paradigms; it has decorticated the learning process in such depth and width that it might be tempting to see in the perennial ebb and flow of the tides of educational change a vast, unfaltering historical continuity. And thus, grasping fervently at the ideas of Comenius and Dewey, we might be tempted to shout: ‘I hold here the ancestor of problem-based learning! Read, and you shall see!’

If we have taken such pains to deconstruct the thought systems of Comenius, Flexner, Dewey, Rogers and Mager, among others, in this chapter on the foundations of the McMaster Programme, it is because we believe that there is some truth to this statement. However, said veracity may not be quite so definite as to warrant the grand label ‘origin’ – at least not on its own. As we have seen, much can be said of the influence of certain educational innovations that predated McMaster – whether that be the centennial Oxbridge tutorial system, the haphazard experiments in medical education around the USA in the 1950s, or the well-established Harvard Case Method. And even as we finish our long journey through these elegant systems of thought and fascinating learning permutations, a feeling of discomfort befalls us: we sense a dissonance between the characters of our small revolutionary play and the literary bigwigs we have so arduously attempted to ascribe unto them as ‘influences’. The discord lies not in the nature of their ideas, for we have found much common ground between the beliefs of Jim Anderson and the philosophy of Carl Rogers, but in their manner and purpose of thinking.

⁴⁵⁰ Moore, *The tutorial system*, 33.

⁴⁵¹ Moore, *The tutorial system*, 27.

I recall a fine autumn day in 2012 during which I visited the late Dr. Barb Mueller, and questioned him about John Dewey. Dr. Mueller winced, thought about it, and asked me whether Dewey was responsible for a certain decimal system.⁴⁵² It turns out that said mathematical tool was developed by a Melville Dewey, who was in no way related to the great educational philosopher. Dr. Mueller was one of the first to be admitted to the EC after the Founding Fathers. He was close to all of them and knew them well for many a-year. What became clear, during this conversation, was the extent to which the educational creativity of McMaster's pioneers was unregimented by formal philosophical thought. That a man so intimately connected with John Evans and his friends had never even heard of John Dewey made it quite improbable that education philosophy played any sort of explicit role in the crystallization of McMaster's ideas. And yet, in the course of our second chapter, I endeavoured to collect references, cross-overs and triangulation points between the discussions in the early days of McMaster and principles of education philosophy – and we saw that with great pains, such cross-overs could be sourced and justified. However, to leave our argument at that would be to miss the central point: all evidence suggests that reference to philosophy or indeed practical educational experiments were either incidental or secondary, rather than central to the development of McMaster's founding programme.

This leaves us with a conundrum on our hands: how is it possible that such a lasting and impacting educational development arose and thrived without a strong and well thought-out theoretical foundation? It is a well-known argument of atheists arguing against deists about the creation of the universe that we are on the world we are in not by design but simply because if the world had not succeeded in surviving up until now, we would not be here to contemplate its existence. And thus, the argument could go: 'if PBL had not, by pure chance and circumstance, been a successful invention, then we would not be here, trying to uncover its roots'. Yet there is something so peculiar about the historical circumstances in which PBL emerged that, although the combination of that particular place and that particular time may be serendipitous, change was afoot, as Harry Thode so astutely noted in 1963, looking for some propitious place to latch onto – and it happened to be McMaster because it offered just the fertile intellectual soil that 'change' needed to bloom.

What was this change? Where did it come from? Geoffrey Norman explained it with one simple word, 'Woodstock':

Woodstock defines the generation. That's all you can say ... Basically, Woodstock occurred in August of 1969, in a farmer's field near the village of Woodstock, New York. And it was a muddy, rainy wet weekend, and hundreds of... at least a hundred thousand hippies descended on this for a rock concert. And they were there for three days, and all the top rock groups like the Stones... not the Beatles, but the Stones were there... We referred to ourselves as the Woodstock generation.⁴⁵³

I asked him whether he thought that this had any meaningful impact beyond the muddy field that served as a temple of rock'n'roll in 1969, and he replied: 'On everything. On everything. It was part of the times, probably more so in North America than Europe. Because Europe has

⁴⁵² Mueller, in interview with the author, October 25, 2012

⁴⁵³ Norman, in interview with the author, October 20, 2013.

its institutions that are much more enduring than that'.⁴⁵⁴ The reference to Woodstock isn't merely an idiosyncratic understanding of a lone faculty member at McMaster – indeed, Dr. Mueller cited its influence in his retrospective on the programme:

The result could probably have happened only during the 1960s, a decade dominated by a youth culture that had endured neither the deprivations of a Depression or the excesses and brutality of a World War but knew the prosperity and unbridled materialism of post-war years. It brought the Peace Corps, the feminist movement, communes, flower children, the Woodstock music festival, free love, civil rights activism, a drug culture and an anti-war movement on almost all American college campuses. The youth of the sixties saw the educational system as stultifying and an undisguised desire for student liberation permeated campus life.⁴⁵⁵

It is clear from Dr. Mueller's account that 'Woodstock' was shorthand for the generational defiance that emerged among the post-war students. Again, we feel here a modicum of dissonance in our story - we began our account of McMaster's small-scale revolution with the description of a FOOF Dean and his team of Toronto-educated medics. And whilst they were certainly not philosophers, it seems even more improbable to imagine them as hippies! What they were, however, was a group of disgruntled medics: medics who had enough of top-down, rigid, dull, disconnected education. John Evans himself expressed this disgruntlement unequivocally in his retrospective interview in 1979:

I hate to admit it in retrospect, but we developed mostly out of negative situations. [...] Remember this was the mid-sixties - the students were really disenchanted with professional education in medicine and yet it should be a terribly exciting experience. [...] In our opinion, the problem was that they were the passive recipients of vast amounts of content knowledge and that they became saturated and bored by it and didn't see the relevance to professional practice. [...] So we said: 'Look, let's get away from the standard building-block structure, let's get away from shoving a lot of content down their throats because they don't retain it very long anyway. Let's try and make it possible for people from a whole host of different backgrounds to enter into this, rather than strictly from the biological science model, which was still dominating the medical schools at this stage of the game.'⁴⁵⁶

And thus we have Woodstock, the fuel for change, combined with the spark of disgruntlement running among a group of bright young medics, at a time where money still flowed through education systems and it was possible to start something totally new at a very small scale: the result was the programme that we have taken such pains to unravel in the course of the past two chapters.

But just as it would be unfair to give full credit to the philosophers that foreshadowed the inception of PBL, it would also be unfair and historically inaccurate to give them no credit whatsoever. The Woodstock era was a time where ideas permeated through institutions like water through cloth. They seeped through more or less diffusely – and some institutions were probably (and will likely be forever) impermeable to all novelty, but by and large, there seems to have been a heightened sensitivity to humanist perspectives on education. The evidence for this can be seen in the number of humanistic experiments in education that sprouted around the

⁴⁵⁴ Norman, in interview with the author, October 20, 2013.

⁴⁵⁵ Mueller, 'McMaster University Medical School'.

⁴⁵⁶ McAuley, 'McMaster Oral History - Dr. J.R. Evans', 9.

world at the same time as McMaster: from Brasilia to Copenhagen, via Bremen.⁴⁵⁷ Most of these experiments failed or were severely challenged by the political storms that buffeted their left-leaning boats in the climate of the Cold War. From Paolo Freire to John Dewey, from revolutionary to simply common-sense, new and old ideas about education congealed into trial-and-error experimentation in new programmes that may not even have been aware of their intellectual inheritance. Why did McMaster's PBL model thrive and survive, then, where so many others based on the same philosophical inspirations floundered and failed? Its political neutrality may serve as a potential explanatory factor, if one considers the fate of explicitly Marxist programmes in Europe: McMaster did not constitute an ideological threat in any broad sense. In addition, the scale at which it started provided it with a much greater margin of error and adaptation capability. But these are aiding factors, rather than central reasons for the success of the programme. Perhaps McMaster's success can be explained instead by the coming together of ideas that fitted with the natural mechanics of learning as later uncovered by cognitive psychology. This coming together may have been partly by chance, partly by context and partly by personalities involved but like a miner who happens to strike gold, it seems that McMaster may have struck at the heart of the nervous centre of learning as a cognitive process. But it did not fall to McMaster to state that the shiny object they unearthed was educational gold – this task was taken up by a small Dutch medical school in the Southernmost part of the Netherlands – a school so deeply enmeshed in the Cognitive Revolution that much of what we know about the mechanisms of Problem-based learning has come from there; in the picturesque city of Maastricht, in the province of Limburg.

Part 1: References

Journals & Books

- Addison, Thomas. *On the constitutional and local effects of disease of the supra-renal capsules*, Special Edition. AL: Gryphon Editions Ltd, 1980.
- Ali, Mohammed A., E.J Thomas, John D. Hamilton, and Michael C. Brain. "Blood and guts": one component of an integrated program in biologic sciences as applied to medicine'. *Canadian Medical Association Journal* 116, no. 1 (1977): 59-62.
- Apple, Michael W. and Kenneth Teitelbaum. 'John Dewey, 1859 – 1952'. In: *Fifty major thinkers on education - from confucius to dewey*, Kindle ed. Edited by Joy A Palmer, 177-182. London, New York: Routledge, 2001.
- Barrows, Howard S. and Donna Mitchell. 'An innovative course in undergraduate neuroscience Experiment in problem-based learning with "problem boxes"'. *Medical Education* 9, no. 4 (1975): 223–230.
- Barrows, Howard S. and Robyn M. Tamblyn. *Problem-based learning, An Approach to Medical Education*. New-York: Springer, 1980.
- Barrows, Howard S. 'In Memoriam: James E. Anderson, MD'. *Teaching and Learning in Medicine* 8, no. 1 (1996): 61.

⁴⁵⁷ On Brasilia: Henning Beck and Mette Müller. *The Room of Maneuver (sic) of an Institution: the case of the university*. Final Thesis, International Development Studies (Roskilde, Denmark: Roskilde University Centre, 1992). See the PhD thesis of Else Hansen on the subject of the history of Roskilde University Centre, Denmark: Else Hansen, *En koral i tidens strøm [A Coral in the Flow of Time]* (Frederiksberg, Denmark: Roskilde Universitetsforlag, 1997); On Bremen: Michael Wolff, *Von Marx zu Darwin - Universität Bremen - Eine Zeitreise*, (Germany: Fact+Film production, 2011).

REVOLUTIONS & RE-ITERATIONS

- Barrows Howard S. 'An Accidental Educator'. In: *Students Matter: The Rewards of University Teaching*. Edited by J Kevin Dorsey and PK Rangachari. Springfield, IL: Southern Illinois University School of Medicine: 2012.
- Benjamin, Ludy T. A history of teaching machines. *American psychologist* 43, no. 9, (1988): 703-712.
- Berlyne, Daniel. *Conflict, arousal, and curiosity*. New York, NY: McGraw-Hill Book Company, 1960.
- Brockett, Ralph G. and Robert C. Donaghy. 'Beyond the Inquiring Mind: Cyril Houle's Connection to Self-Directed Learning'. Paper presented at Adult Education Research Conference, Knoxville, TN: The University of Tennessee, 2005. <http://newprairiepress.org/aerc/2005/papers/68/>
- Cannon, Walter B. The Case Method of Teaching Systematic Medicine. *Boston Medical and Surgical Journal* 142, no. 2 (1900): 31-36.
- Campbell, Edward J. Moran. The McMaster Medical School at Hamilton, Ontario. *The Lancet* (1970): 763-767.
- Campbell, Edward J. Moran. *Not always on the level* (The Memoir Club Series n°3). Wiley-Blackwell, 1988.
- Clark, A. Bess. 'An Experiment in Problem-Teaching'. *The English Journal* 6, no. 8 (1917): 535-538.
- Copeland, Melvin T. 'The Development of Principles by the Use of Cases.' In *The Case Method of Instruction: A Related Series of Articles*, 1st ed. Edited by Cecil Fraser, 26-32. New York & London: McGraw-Hill Book Company Inc. 1931.
- Dewey, John. *Democracy and Education*. Oxford, UK: Benediction Classics, 2011.
- Dewey, John. *How we Think*. Lexington MA: D.C. Heath and Company, 1933.
- Dewing, Arthur S. An Introduction to the Use of Cases. In *The Case Method of Instruction: A Related Series of Articles*, 1st ed. Edited by Cecil Fraser, 1-11. New York & London: McGraw-Hill Book Company Inc. 1931.
- Donham, Wallace B. 'Business teaching by the case system'. *The American Economic Review* 12, no. 1 (1922): 53-65.
- Donham, Wallace B. (1931) 'Business Teaching by the Case System'. In *The Case Method of Instruction: A Related Series of Articles*, 1st ed. Edited by Cecil Fraser, 11-25. New York & London: McGraw-Hill Book Company Inc. 1931.
- Flexner, Abraham. *The American College: a criticism*. New York: The Century Co, 1908.
- Flexner, Abraham. *Medical education in the United States and Canada: a report to the Carnegie Foundation for the Advancement of Teaching* (No. 4). Carnegie Foundation for the Advancement of Teaching, 1910.
- Fraser, Cecil. *The Case Method of Instruction: A Related Series of Articles*, 1st ed. New York & London: McGraw-Hill Book Company Inc, 1931.
- Fraser, Cecil. 'The Use of Cases in the Classroom'. In *The Case Method of Instruction: A Related Series of Articles*, 1st ed. Edited by Cecil Fraser, 33-39. New York & London: McGraw-Hill Book Company Inc. 1931.
- Garvin, David A. Making the case. *Harvard Magazine* 106, no. 1 (2003): 56-65.
- Gibbons, Maurice, Alan Bailey, Paul Comeau, Joe Schmuck, Sally Seymour and David Wallace. 'Toward a Theory of Self-Directed Learning: a Study of Experts Without Formal Training'. *Journal of Humanistic Psychology* 20, no. 2 (1980): 41-56.
- Glassman, Michael. 'Dewey and Vygotsky: Society, experience, and inquiry in educational practice'. *Educational Researcher* 30, no. 4 (2001): 3-14.
- Hamilton, John D. 'The McMaster Curriculum: A Critique'. *The British Medical Journal* 6019, no. 1 (1976): 1-7.
- Hamilton, John D. 'Problem-Based Learning: From where to where?' *The Clinical Teacher* 2 (2005): 45-48.
- Hansen, Else. *En koral i tidens strøm [A Coral in the Flow of Time]*. Frederiksberg, Denmark: Roskilde Universitetsforlag, 1997.
- Howell, Jack, John Dickinson and John Hamilton, 'Edward James Moran Campbell', *British Medical Journal* 329, no. 7474 (2004): 1105.
- Hendry, Graham D., Miriam Frommer, and Richard A. Walker, 'Constructivism and problem-based learning', *Journal of further and higher education* 23, no. 3 (1999): 369-371.
- Hillen, Harry, Albert Scherpier, and Wynand Wijnen, 'History of problem-based learning in medical education'. In: *Lessons from problem-based learning*. Edited by Henk van Berkel, Albert Scherpier, Harry Hillen, and Cees van der Vleuten, 5-12. New York: Oxford University Press: 2010.
- Hosic, James F. (1918). 'An Outline of the Problem-Project Method'. *The English Journal* 7, no. 9 (1918): 599-603.
- Houle, Cyril O. *The Inquiring Mind*. Madison, WI: University of Wisconsin Press, 1961.
- Houle, Cyril O. *Continuing Your Education*. New York: McGraw-Hill Book Company, 1964.
- Kaufman, Arthur. *Implementing Problem Based Learning in Medical Education*. New York: Springer Publishing Company, 1985.
- Keatinge, Maurice W. *The Great Didactic of John Amos Comenius: translated into English and edited with biographical, historical and critical introductions* New York: Russell & Russell, 1967.

CHAPTER 2: THE MCMMASTER PHILOSOPHY

- Kendall, Patricia L and George G Reader. 'Innovations in medical education of the 1950s contrasted with those of the 1970s and 1980s'. *Journal of Health and Social Behavior* 29, no. 4 (1988): 279–293.
- Kimball, Bruce A. *Emergence of case method teaching, 1870s-1990s*. Bloomington, IN: The Poynter Center, Indiana University, 1995.
- Kimball, Bruce A. *The inception of modern professional education: CC Langdell, 1826-1906*. Chapel Hill, NC: University of North Carolina Press, 2009.
- Knoll, Michael. 'A Marriage on the Rocks': An Unknown Letter by William H. Kilpatrick about His Project Method. *Online Submission*, 2010.
- Knowles, Malcolm S. *Self-directed learning: a guide for learners and teachers*. Chicago, IL: Association Press, 1975.
- Kwan, Chui Yin, and Leslie Tam. 'Hybrid PBL-What is in a Name?' *Journal Of Medical Education* 13, no. 3 (2009): 76-82.
- Ludmerer, Karen M. 'Commentary: understanding the Flexner report'. *Academic Medicine* 85, no. 2 (2010): 193–196.
- Mager, Robert F. *Preparing Instructional Objectives*. Palo Alto, CA: Fearon Publishers, 1962.
- Mason, John B. 'Self-Directed Learning: A Deweyan Reconstruction', Paper presented at the Annual Meeting of the American Educational Research Association. Boston, MA, April 16-20, 1990.
- McNair, Malcolm P. 'The Collection of Cases'. In *The Case Method of Instruction: A Related Series of Articles*, 1st ed. Edited by Cecil Fraser, 142-158. New York & London: McGraw-Hill Book Company Inc., 1931.
- Moore, Will. *The tutorial system and its future*. New York: Pergamon Press, 1968.
- Mueller, C. Barber. 'McMaster University Medical School: The Little School that Could – and Did'. *McMaster University Medical Journal* 5, no 1 (2008): 29-33.
- Murphy, Siobhan, Irene Hartigan, Nuala Walshe, Angela V. Flynn, and Sinead O'Brien. 'Merging Problem-Based Learning and Simulation as an Innovative Pedagogy in Nurse Education.' *Clinical Simulation in Nursing* 7, no. 4 (2011), e141–e148.
- Neufeld, Victor R. and William B. Spaulding. 'Use Of Learning Resources At McMaster University'. *The British Medical Journal* 5871, no. 3 (1973): 99–101.
- Neufeld, Victor R and Howard S Barrows. 'The "McMaster Philosophy": An Approach to Medical Education'. *Journal of Medical Education* 49 (1974): 1040–1050.
- Norman, Geoffrey R, Alan Neville, Jenifer M Blake, and C Barber Mueller. 'Assessment steers learning down the right road: Impact of progress testing on licensing examination performance'. *Medical Teacher* 32, no. 6 (2010): 496–499.
- Palfreyman, David. *The Oxford Tutorial: 'Thanks, you taught me how to think'* Oxford, UK: Oxford Centre for Higher Education Policy Studies, 2001.
- Price, Bob. 'Problem-based learning the distance learning way: a bridge too far?' *Nurse Education Today* 20 (2000): 98-105.
- Rogers, Carl R. *Client-centered Therapy: Its Current Practice, Implications and Theory*. London, UK: Constable, 1951.
- Rogers, Carl R. *Freedom to learn*. Columbus, OH: C.E. Merrill Pub. Co., 1969.
- Rousseau, Jean Jacques. *A discourse upon the origin and foundation of the inequality among mankind*. New York: B. Franklin, 1971.
- Sackett, Dave L. 'Evidence-based medicine'. *Seminars in Perinatology* 21, no. 1 (1997): 3-5.
- Savery, John R. and Thomas M Duffy, 'Problem based learning: An instructional model and its constructivist framework', *Educational technology* 35, no. 5 (1995): 31-38.
- Savin-Baden, Maggi. *Problem-based learning in higher education: Untold stories*. McGraw-Hill International, 2000.
- Schechter, Barbara. "'Development as an Aim of Education": A Reconsideration of Dewey's Vision'. *Curriculum Inquiry* 41, no. 2 (2011): 250–266.
- Schmidt, Henk G. *Activatie van voorkennis, intrinsieke motivatie en de verwerking van tekst* (Activation of prior knowledge, intrinsic motivation and text processing). Doctoral Dissertation. Apeldoorn, Netherlands: Van Walraven, 1982.
- Schmidt, Henk G. Foundations of problem-based learning: some explanatory notes. *Medical Education* 27, no. 5 (1993): 422–432.
- Schmidt, Henk G. 'A brief history of problem-based learning'. In *One-day, one-problem, an approach to problem-based learning*. Edited by Glen O'Grady, Elaine HJ Yew, Karen PL Goh, and Henk G Schmidt, 21-40. Singapore: Springer, 2012.
- Schmidt, Henk G, Victor R. Neufeld, Zohair M. Nooman, and Toye Ogunbode. 'Network of Community-Oriented Educational Institutions for the Health Sciences for the Health Sciences', *Academic Medicine* 66, no. 5 (1991): 259–263.

REVOLUTIONS & RE-ITERATIONS

- Schmidt, Henk G., Henk T. van der Molen, Wilco W.R. te Winkel, and Wynand H.F.W Wijnen, 'Constructivist, Problem-Based Learning Does Work: A Meta-Analysis of Curricular Comparisons Involving a Single Medical School'. *Educational Psychologist* 44, no 4 (2009): 227–249.
- Scott, Karen W. 'Self-directed learners' concept of self as a learner: congruous autonomy', *International Journal Of Self-Directed Learning* 3, no. 2 (2006), 1-13.
- Skinner, Burrhus F. 'Teaching machines', *Science* 128, no. 3330 (1958): 969-977.
- Spaulding, William B. 'The undergraduate medical curriculum: McMaster university'. *Canadian Medical Association Journal* 100, no. 14 (1969): 659.
- Spaulding, William B and Victor R Neufeld. 'Regionalization Of Medical Education At McMaster University'. *The British Medical Journal* 3, no. 5871 (1973): 95–98.
- Spaulding, William B. *Revitalizing Medical Education, McMaster Medical School the Early Years 1965-1974*. Hamilton, ON: B.C. Decker Inc., 1991.
- Tough, Alan. *The Adult's Learning Projects*. Toronto, ON: Institute for Studies in Education: 1971.
- Vanderblue, Homer B. and Charles I. Gragg. In *The Case Method of Instruction: A Related Series of Articles*, 1st ed. Edited by Cecil Fraser, 107-121. New York & London: McGraw-Hill Book Company Inc. 1931.
- Weber, Eric T. 'Dewey and Rawls on Education', *Human Studies* 31, no. 4 (2008): 361–382.
- Whipple, James B. and D.C. Williams, 'The Inquiring Mind. By Cyril O. Houle. The University of Wisconsin Press, 1961', Review in *Adult Education Quarterly* 13 (1963): 122–123.
- Williams, Greer. *Western Reserve's Experiment in Medical Education and Its Outcomes*. New York: Oxford University Press, 1980.

Archive Material

- Ad Hoc Committee On Undergraduate Education, 'Summary of Report of the Ad Hoc Committee on Undergraduate Education - Presented to the Council of the Faculty of Medicine, September 24, 1969.' Report from 1969. Educational Programme Committee - 1969 - HHS / FHS Archives, Box 232.5;5. McMaster University, Hamilton, Ontario.
- Anderson, James. '7. Evaluation - To: Members of the Education Committee - December 30, 1969'. Report from 1969. Educational Programme Committee - 1969 - HHS / FHS Archives, Box 232.5;4. McMaster University, Hamilton, Ontario.
- Anderson, James 'A week on the G.I. system, a mythical log of John Smith on his second week of systems teaching', cited by William Spaulding in his report 'Objectives and Outline of the Undergraduate Educational Programme' from March 1967. Educational Programme Committee – 1966-67 - HHS/ FHS Archives, Box 232.4;1. McMaster University, Hamilton, Ontario.
- Anderson, James. 'Re: Progress Report - To: Faculty involved in Phase I'. Report from 1969. Educational Programme Committee - 1969 - HHS / FHS Archives, Box 232.5;4. McMaster University, Hamilton, Ontario.
- Bliss, J. 'Letter to Dr. John R. Evans - February 28, 1968'. Letter from 1968. Educational Programme Committee - 1968 - HHS/ FHS Archives, Box 232.4;4. McMaster University, Hamilton, Ontario.
- Campbell, Moran. 'Re: Suggested Goals for Phase IV - Letter to W.J. Walsh, W.B. Spaulding and J.D. Kraemer'. Letter from 1969. Educational Programme Committee - 1969 - HHS / FHS Archives, Box 232.5;2. McMaster University, Hamilton, Ontario.
- Campbell, Edward Moran, Dave Sackett, Alex Adsett, C Barber Mueller. 'Founding Fathers Interview'. Transcript of an interview done by Geoffrey R Norman in 2003. Transcript received from Geoffrey Norman at McMaster University, Hamilton, Ontario.
- Dickinson, Charles 'Re: Cardiovascular Phase III - To: C.J. Schwartz - July 29, 1970'. Report from 1970. Educational Programme Committee - 1970 - HHS / FHS Archives, Box 232.5;8. McMaster University, Hamilton, Ontario.
- Education Programme Committee. 'Phase I Programme: 1969'. Memorandum from 1969. Educational Programme Committee - 1966-1967 - HHS/ FHS Archives, Box 232.4;1. McMaster University, Hamilton, Ontario.
- Education Programme Committee 'Report of Educational Programme Committee - Jan 3 1967'. Report from January 1967. Educational Programme Committee - 1966-1967, Box 232.4;1. McMaster University, Hamilton, Ontario.
- Evans, John. 'Confidential (Accreditation Visit)'. Undated handwritten notes circa 1968. Accreditation Preparation Visit - HHS/FHS Archives, Box 144.2;1. McMaster University, Hamilton, Ontario.
- Evans, John. 'General Objectives'. Memorandum from 1966. Objectives of the Faculty School of Medicine - HHS/FHS Archives, Box 145.8;1. McMaster University, Hamilton, Ontario.
- Horizontal Programme Planning Committee. 'Interim Report'. Report from 1968. Educational Programme Committee - 1968 - HHS/ FHS Archives, Box 232.4;6. McMaster University, Hamilton, Ontario.

CHAPTER 2: THE MCMMASTER PHILOSOPHY

- Kraemer, James. 'Education Committee Meeting - April 8, 1968'. Minutes of a meeting held at McMaster University on April 8, 1968. Education Committee Minutes - April-June 1968 - HHS / FHS Archives, Box 232.4;5. McMaster University, Hamilton, Ontario.
- Kraemer, James. 'Education Committee Meeting - August 30, 1968'. Minutes of a meeting held at McMaster University on August 30, 1968. Educational Programme Committee - 1968 - HHS/ FHS Archives, Box 232.4;6. McMaster University, Hamilton, Ontario.
- Kraemer, James. 'Education Committee Meeting - September 6, 1968'. Minutes of a meeting held at McMaster University on September 6, 1968. Educational Programme Committee - 1968 - HHS/ FHS Archives, Box 232.4;6. McMaster University, Hamilton, Ontario.
- Kraemer, James. 'Re: The Problem-Solving Problem'. Memorandum drafted for a Committee meeting in Summer 1968. Education Committee Minutes - July-Sept 1968 - HHS / FHS Archives, Box 232.4;6. McMaster University, Hamilton, Ontario
- Kraemer, James. 'Education Committee Meeting - October 11, 1968'. Minutes of a meeting held at McMaster University on October 11, 1968. Educational Programme Committee - 1968 - HHS/ FHS Archives, Box 232.4;7. McMaster University, Hamilton, Ontario.
- Kraemer, James. 'Joint Meeting of Phase III and Education Committees'. Minutes of a meeting held at McMaster University in 1968. Educational Programme Committee - 1968 - HHS/ FHS Archives, Box 232.4;6. McMaster University, Hamilton, Ontario.
- Kraemer, James. 'Education Committee Meeting - October 25, 1968'. Minutes of a meeting held at McMaster University on October 25, 1968. Educational Programme Committee - 1968 - HHS/ FHS Archives, Box 232.4;7. McMaster University, Hamilton, Ontario.
- Kraemer, James. 'Education Committee Meeting - November 1, 1968'. Minutes of a meeting held at McMaster University on November 1, 1968. Educational Programme Committee - 1968 - HHS/ FHS Archives, Box 232.4;7. McMaster University, Hamilton, Ontario.
- Kraemer, James. 'Education Committee Meeting - March 28, 1969'. Minutes of a meeting held at McMaster University on March 28, 1969. Educational Programme Committee - 1969 - HHS/ FHS Archives, Box 232.5;1. McMaster University, Hamilton, Ontario.
- Kraemer, James. 'Education Committee Meeting - May 2, 1969'. Minutes of a meeting held at McMaster University on May 2, 1969. Educational Programme Committee - 1969 - HHS / FHS Archives, Box 232.5;2. McMaster University, Hamilton, Ontario.
- Kraemer, James. 'Education Committee Meeting - May 28, 1969'. Minutes of a meeting held at McMaster University on May 28, 1969. Educational Programme Committee - 1969 - HHS / FHS Archives, Box 232.5;2. McMaster University, Hamilton, Ontario.
- Kraemer, James. 'Education Committee Meeting - June 25, 1969'. Minutes of a meeting held at McMaster University on June 25, 1969. Educational Programme Committee - 1969 - HHS / FHS Archives, Box 232.5;2. McMaster University, Hamilton, Ontario.
- Kraemer, James. 'Education Committee Meeting - July 9, 1969'. Minutes of a meeting held at McMaster University on June 9, 1969. Educational Programme Committee - 1969 - HHS / FHS Archives, Box 232.5;3. McMaster University, Hamilton, Ontario.
- Kraemer, James. 'Education Committee Meeting - December 3, 1969'. Minutes of a meeting held at McMaster University on December 3, 1969. Educational Programme Committee - 1969 - HHS / FHS Archives, Box 232.5;4. McMaster University, Hamilton, Ontario.
- McAuley, Joan. 'McMaster Oral History - Dr. J.E. Anderson - 2nd February 1979'. Interview Transcript. Founding Fathers Interviews - HHS/FHS Archives, McMaster University, Hamilton, Ontario.
- McAuley, Joan. 'McMaster Oral History - Dr. J.R. Evans - 28th September 1979'. Interview Transcript. Founding Fathers Interviews - HHS/FHS Archives, McMaster University, Hamilton, Ontario.
- McAuley, Joan. 'McMaster Oral History - Dr. W.B. Spaulding - 25th October 1978'. Interview Transcript. Founding Fathers Interviews - HHS/FHS Archives, McMaster University, Hamilton, Ontario.
- McNabb, Alan. 'To: W.B. Spaulding, M.D. Re: Phase III Curriculum'. Letter from 1969. Educational Programme Committee - 1969 - HHS / FHS Archives, Box 232.5;2. McMaster University, Hamilton, Ontario.
- Mustard, James Fraser. 'Objectives of the Faculty of Medicine' – Letter to Dave L Sackett from November 11, 1968. Box 145.8,1. HHS/FHS Archives, McMaster University, Hamilton, Ontario.
- Rogers, Carl. 'The Characteristics of a Helping Relationship'. Machine-typed extract from an article by Rogers from 1958. Provenance unknown. stored in 'Phase I - Introduction, Simulated Patients, Clinical Skills, Evaluation, Interviewing' - 1979 - HHS / FHS Archives, Box 244.1;1. McMaster University, Hamilton, Ontario.
- Sackett, Dave. 'Provisional Curriculum Proposal - Draft II'. Undated Draft proposal. Educational Programme Committee - 1968 - HHS/ FHS Archives, Box 232.4;4. McMaster University, Hamilton, Ontario.

REVOLUTIONS & RE-ITERATIONS

- Sackett, Dave. 'Excerpts from the Horizontal Programme Planning Committee Meeting'. Minutes of a Meeting held at McMaster University on March 19, 1969. Educational Programme Committee - 1969 - HHS/ FHS Archives, Box 232.1;5. McMaster University, Hamilton, Ontario.
- Sackett, Dave. 'The Medical Student and Society'. Memorandum from 1969. Educational Programme Committee - 1969 - HHS / FHS Archives, Box 232.5;1. McMaster University, Hamilton, Ontario.
- Sackett, Dave. 'Re: Phase II - Ischaemia'. Letter to Dr. George D Sweeney from 1971. Phase II Ischaemia (1969-1970) - HHS/ FHS Archives, Box 242.1;7. McMaster University, Hamilton, Ontario.
- Spaulding, William. 'Visit to Western University School of Medicine, May 15th and 16th, 1967'. Report from 1967. Educational Programme Committee - 1966-1967 - HHS/ FHS Archives, Box 232.4;1. McMaster University, Hamilton, Ontario.
- Spaulding, William. 'Educational Programme Committee Meeting'. Minutes, from a meeting held at McMaster University on December 22, 1967. Educational Programme Committee - 1966-1967 - HHS/ FHS Archives, Box 232.4;3. McMaster University, Hamilton, Ontario.
- Spaulding, William. 'Objectives and Outline of the Undergraduate Educational Programme, McMaster Medical School'. Memorandum from April 1967. Educational Programme Committee - 1966-1967 - HHS/ FHS Archives, Box 232.4;1. McMaster University, Hamilton, Ontario.
- Spaulding, William. (1968a) 'Guide for Planners'. Proposal from March 1, 1968. Educational Programme Committee - 1968 - HHS/ FHS Archives, Box 232.4;4. McMaster University, Hamilton, Ontario.
- Spaulding, William. (1968b) 'Re: Policy Concerning Examinations - To: Members of the Education Committee'. Memorandum from April 18, 1968. Education Committee Minutes - April-June 1968 - HHS / FHS Archives, Box 232.4;5. McMaster University, Hamilton, Ontario.
- Spaulding, William. 'The Undergraduate Medical Curriculum: McMaster University'. Report from October 31, 1968. Objectives of the Faculty School of Medicine - HHS/FHS Archives, Box 145.8;1. McMaster University, Hamilton, Ontario.
- Thode, Henry. Report and Recommendations Regarding a Medical School at McMaster University. Report from 1963. Accreditation Preparation Visit - HHS/FHS Archives, Box 144.2;1. McMaster University, Hamilton, Ontario.
- Unknown, 'Phase I: 1970, Guidelines to Operating the Programme'. Report from 1970. Educational Programme Committee - 1970 - HHS/ FHS Archives, Box 232.5;8. McMaster University, Hamilton, Ontario.
- Unknown. 'The Objectives Handbook' Draft report from April 1979. Educational Programme Committee - 1979 - HHS/ FHS Archives, Box 233.8;3. McMaster University, Hamilton, Ontario.
- Unknown. 'Related Policies: Assessment of Students'. Undated Memorandum. Educational Programme Committee - 1966-1967 - HHS/ FHS Archives, Box 232.4;1. McMaster University, Hamilton, Ontario.
- Vaughan, Paul. 'Valedictory Address, McMaster University MD Class 82'. Transcript of a speech from May 14, 1982. Education Programme Committee - 1981-1982 - HHS/FHS Archives, Box 233.3;6. McMaster University, Hamilton, Ontario.
- Walsh, William. 'Attitudes in Medicine - A Draft Submission'. Draft memorandum from January 11, 1968. Educational Programme Committee - 1968 - HHS/ FHS Archives, Box 232.4;4. McMaster University, Hamilton, ON.
- Walsh, William. (1969) 'Progress Report - Phase IV'. Report from July 18, 1969. Educational Programme Committee - 1969 - HHS / FHS Archives, Box 232.5;3. McMaster University, Hamilton, Ontario.
- Walsh, William. 'Re: Evaluation'. Memorandum addressed to the Education Committee from December 15, 1969. Educational Programme Committee - 1969 - HHS / FHS Archives, Box 232.5;4. McMaster University, Hamilton, Ontario.

Web-based material

- 'Barrows remembered for contributions to education'. *McMaster Faculty of Health Sciences Newsmagazine*, 5, no. 2. Faculty of Health Sciences McMaster University. Published in 2011. Accessed December 23, 2013. http://fhs.mcmaster.ca/networkfall2011/barrows_howard.html
- 'Community of Distinction'. Faculty of Health Sciences McMaster University. Accessed December 12, 2013. http://fhs.mcmaster.ca/main/community_of_distinction.html
- 'Description of the Foundations'. Faculty of Health Sciences McMaster University. Accessed August 1, 2014. http://fhs.mcmaster.ca/mdprog/description_of_foundations.html
- 'Education Methods'. Faculty of Health Sciences McMaster University. Accessed August 1, 2014. http://fhs.mcmaster.ca/mdprog/education_methods.html
- 'Medical school founder Fraser Mustard dies'. News Releases. McMaster University Faculty of Health Sciences. Published in 2011. Accessed: 28 Nov 2013. http://fhs.mcmaster.ca/main/news/news_2011/fraser_mustard.html

CHAPTER 2: THE MCMASTER PHILOSOPHY

- 'McMaster University gives birth to a medical school'. McMaster Faculty of Health Sciences Newsmagazine 6, no. 2 (2012). Accessed November 12, 2013. http://fhs.mcmaster.ca/networkfall2012/medical_school.html
- 'Profiles of the Founders of McMaster Cardiology'. Faculty of Health Sciences McMaster University. Accessed December 10, 2013. <http://fhs.mcmaster.ca/cardiology/history/profiles.html>
- 'William Bray Spaulding | Living History'. Living History - University of Toronto Faculty of Medicine. Published 2012. Accessed December 6, 2013. <http://livinghistory.med.utoronto.ca/people/william-bray-spaulding>
- Roland, Charles G. 'Obituary / Obituaire William Bray Spaulding 1922-1993'. Accessed 6 Dec 2013. <http://www.cbmh.ca/index.php/cbmh/article/viewFile/1465/1431>
- Jerkic, SM. 'The Influence of James E. Anderson on Canadian Physical Anthropology.' In: *Out of the Past: The History of Human Osteology at the University of Toronto*. Edited by L Sawchuk and S Pfeiffer, (University of Toronto at Scarborough: CITDPress, 2001). Accessed December 4, 2013. <http://citdpress.utoronto.ca/osteology/pfeiffer.html>.
- Moore, KL. *John Charles Boileau Grant*. Published in 2012. Accessed December 4, 2013. <http://www.anatomy.org/content/john-charles-boileau-grant>
- Oral History Association. 'Oral History: Defined'. Accessed July 22, 2014. <http://www.oralhistory.org/about/do-oral-history/>
- Wainman, Bruce. 'History of the Education Program in Anatomy'. Accessed December 4, 2013. <http://fhs.mcmaster.ca/anatomy/history.html>

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PART 2

A Case of ‘You Lead, I Follow’?

*Development of Maastricht University’s
Problem-based Learning Programme, 1970 – 1985.*

This part of the treatise picks up chronologically where the previous part left off and takes us across the pond to the Southern Dutch city of Maastricht, the birthplace of the second ever medical problem-based learning programme. Our inquiry has now moved beyond the intellectual turmoil and unbridled spirit of the sixties from which McMaster was born, and into the more sober financial and intellectual age that characterized the Netherlands in the 1970s. The question guiding us through this section of our inquiry is no longer the identification of the origins of PBL from a wealth of philosophical and institutional inspirations, but rather the outcome of the first ever process of adaptation of McMaster's programme to another institution. Was the import of PBL into Maastricht simply a case of taking McMaster's ideas and methods and applying them willy-nilly? Was there space for intellectual discussion on problem-based education at the Maastricht Faculty of Medicine, or had all debate been exhausted at McMaster? The intention of this chapter is to show that the Maastricht experiment was far from a mere *repro* of the McMaster blueprint – not only in terms of its practical implementation, which differed to some extent from the loose structure of the McMaster programme, but also in terms of the battles of ideas that took place at the end of the 1970s and beginning of the 1980s. Gone are the grand statements backed by references to Dewey, Flexner and Comenius, finished is the time for lyrical optimism on the defeat of paternalism in education! This was the age of cognitive psychology – a time when educationists believed that what was left wanting in philosophy could be provided for with science, and what more exciting mission than to fill the quasi-complete vacuum of the scientific study of education?

The two forthcoming chapters will therefore take the reader back to 1970, when the earliest plans for the *Rijksuniversiteit Limburg* were forged, and attempt to provide a coherent and comprehensive account of the ways in which the Maastricht curriculum developed a life of its own. Having set the scene, we will once again delve into the intellectual debates that shaped the Faculty of Medicine's take on PBL. It may be worth noting that this portion of the treatise will concern itself exclusively with the Faculty of Medicine. In addition, citations directly extracted from Dutch texts and archives will be rendered in their original language, but a translation is provided in the footnotes.

We hope to convince the reader that in a sense, the Maastricht experiment is at least as much worthy of the qualifier 'revolution' as McMaster was – far from re-iterating McMaster's philosophy, it developed an intellectual world of its own, which, some might argue, was the most successful attempt to systematically theorize PBL in the method's 50-year history.

In this chapter, we will lay out the main points that characterized the Maastricht curriculum between its inception in 1970 and its crystallization in 1980 with the opening of the second Faculty of the *Rijksuniversiteit Limburg*. Although we will introduce the key figures of the early days of Maastricht, the reader should not expect the same quasi-theatrical setup as the Canadian chapters – indeed, the Dutch PBL experiment relied far less on thespian characters and far more on strong institutionalization. The purpose of this chapter, therefore, is less scene-setting than providing an in-depth analysis of the peculiarities that distinguished Maastricht from McMaster and made it a revolutionary programme in its own right. After presenting the founders of the programme, the chapter will take the reader through the highlights of the early Maastricht curriculum, before focusing on four major innovations born and bred at the Limburgian Faculty of Medicine. From there, we will move in the next chapter to the intellectual debates that emerged in the 1970s surrounding the learning process in PBL.

The Founders

The history of Maastricht University is rich with political intrigue and socio-economic stakes that reach far beyond the scope of a treatise on the history of problem-based learning. Peter Knegtman wrote an extensive history of the Faculty of Medicine, covering precisely these aspects – we will thus refer the reader to his work for the details of the negotiations that led to the implementation of the eighth medical Faculty of the Netherlands in the former mining region of Limburg.⁴⁵⁸ A new medical school was a welcome gift to a region suffering economic decline as it underwent the closure of its last coalmines, and the man pushing this project from the beginning was the Catholic Socialist (something of an oxymoronic proposition at the time) Sjeng Tans. We will not dwell much on Tans and his role – much like Harry Thode of McMaster, his contribution was primarily to seek out the people that would best suit the educational mission of his project, and once chosen, to leave it in their capable hands.

Preparations for the new university began in 1970, and although the first class was admitted in September 1974, it is important to note that the official university status was not signed until 1976. In that sense, the first two intakes were not guaranteed a university degree at the time that they enrolled! It is thus very clear that Tans was a man willing to take a gamble to uphold his educational vision – a trait which places his willingness to let Founding Dean Tiddens experiment with problem-based learning in context. Although we will not linger on the implications of the legal status of the university, one of the first students who enrolled in 1974 told his story in such a way that set the scene for the educational decisions that were made at Maastricht thereafter:

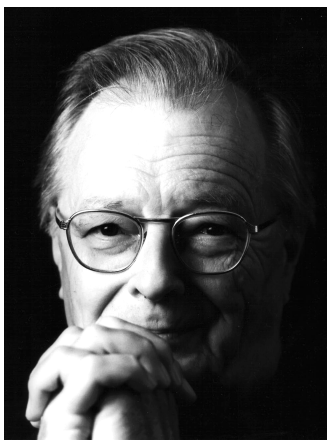
I knew in the beginning of '74 I had a place in medical school. At that time, 7 medical schools, and the one I chose was Utrecht. Then somewhere in May or June, I don't know exactly, I got a letter from at that time the Secretary of Education saying: 'Hey guy, you are going to study medicine, but we are starting up

⁴⁵⁸ Peter J. Knegtman, *De Medische Faculteit Maastricht: een nieuwe universiteit in een herstructureringsgebied, 1969-1984* [The Medical Faculty Maastricht: a new university in an era of restructuring] (Assen, Netherlands: Van Gorcum, 1992).

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Maastricht as a course, it's not officially a university – it will be a course – and then the final decision will be taken somewhere in the few years to come. And if you go to Maastricht your place in the other university... pfft. You lose it'. So that was the point: I had the choice to go to Maastricht or to Utrecht. And I had two things: one is that one of my good friend from high school, his uncle was a professor in internal medicine, and he was coming from Rotterdam to Maastricht. And I had a short chat with him and he was saying: 'this is going to be a new educational model, it's going to be problem based, it's going to be small groups, it's gonna be novel'. And you start with 50 students. So I had a choice of going to a well-seasoned university with 300 students getting in the first year, knowing that there will be 200 in the next year and then after that 150. Because that's the model which was... or going to Maastricht in which you would start with 50, new model, and people probably trying to get 50 to the next round and 50 out of the medical school at the end. OK. What are the chances that after year or a year and a half the parliament will say that they're not gonna make a university there? I thought that was a non-argument because the university was kind of... I thought the political party which will decide to stop this and say 'no university in Maastricht' although it was promised when the coal mines closed that we would have another university and a business and things from that, I thought: 'that party is out of power for the rest of their lives in the Netherlands, in Limburg at least'. So I thought the chances of having a good education, an interesting education, with a slight chance of getting a course without getting into university – I took my chances.⁴⁵⁹

It seems that 'taking chances' was a chief criterion of most who joined in the Faculty's early days. So it was that in September 1974, Prof. Harmen Tiddens, flanked by Prof. Wynand Wijnen and a small group of young doctors, psychologists, basic scientists and educationists, opened the door to the world's second PBL programme.



Prof.dr. Harmannus A.W.M. Tiddens

*Founding Dean of the Faculty of Medicine
First Rector Magnificus of the Rijksuniversiteit Limburg⁴⁶⁰*

Dr. Harmen Tiddens was already a seasoned paediatrician in the Netherlands when in 1974, at the age of 48, he was appointed Dean to the new Faculty of Medicine of the soon to be University of Limburg, in the Southern Dutch city of Maastricht.⁴⁶¹

Tiddens left his native Brabant to study at Utrecht University, from which he graduated in 1957, whilst working in paediatrics at the *Sint-Antoniushuis* in Helmond.⁴⁶² In 1969, he was appointed Full Professor, with the curious remit of 'methods of education in medicine, particularly in paediatrics' at Utrecht University, thus presaging his career as an education pioneer in Limburg.⁴⁶³ Tiddens, being rather fond of international travel, involved himself in the World Health Organization's discussions on medical education, and consequently came into contact with the best practice in

⁴⁵⁹ Job Metsemakers (former student from 1974 at the MFM) in interview with the author, at Maastricht University, April 16, 2013.

⁴⁶⁰ Image source: Wikimedia commons.

⁴⁶¹ 'H. Tiddens (1923-2002) - Vernieuwend Professor' [H. Tiddens (1923-2002) – Renewed Professor] NRC Handelsblad, last modified 2002, accessed April 15, 2015. <http://www.tiddens.xenat.nl/harmen-tiddens/>

⁴⁶² Harmen A.W.M. Tiddens, *Het renale syndroom van De Toni met dwerggroei. Proefschrift*. [The De Toni renal syndrome with dwarfism. A thesis] (Amsterdam: Diligentia, 1957).

⁴⁶³ Knechtmans, *Medische Faculteit Maastricht*, 55.

the field worldwide.⁴⁶⁴ Thus, the same year that he obtained his professorship, Tiddens met John Evans during a visit to Michigan State University, and thereby was introduced to McMaster's burgeoning problem-based learning programme.⁴⁶⁵ As described by Maastricht early-days education researcher Peter Bouhuijs, this encounter deeply marked Tiddens and was naturally brought to the table when Tiddens was invited to share his views on medical education back in the Netherlands:

He knew the people who were interested in modernizing medical education in the States. So the people from Michigan... there was a whole bunch that he knew and he said: 'Let's go to this new place, McMaster, and see what they are doing'. And then, on the way back, they decided, they said: 'We want to do things differently'. Here it is. 'Nobody can stop us if this is sort of an experiment, trying new ways...'⁴⁶⁶

It is not clear exactly how Tiddens was chosen to lead the Maastricht project, but Maastricht historian Peter Knegtmans suggests that the paediatrician's '*grote welsprekendheid*' (great eloquence) in promoting the ideas that he absorbed during his time in the U.S.A. largely contributed.⁴⁶⁷ It seems that between 1970 and 1971, Tiddens spent considerable time advocating increased efficiency, self-directedness, ties to professional practice and the promotion of family medicine in medical education through a series of presentations and reports to various stakeholders in the new university project.⁴⁶⁸ By 1971, he had caught the attention of the university project backer Sjeng Tans, who saw in him a potential leader for the project and afforded him his support, despite differences of opinion on the inclusion an Academic Hospital in the Medical School. According to his colleague Evert Reerink, that support continued after Tiddens became Dean and Tans Chairman of the Board of the University.⁴⁶⁹ By 1972, Tiddens was such an integral part of the Maastricht project that he was able to strongly imprint the idea a more progressive, problem-oriented and family medicine-driven medical curriculum into the so-called *Basisfilosofie* of the Faculty, which was published in the Dutch journal *Medisch Contact*.⁴⁷⁰ From there on, his position as a broker between the worlds of medicine and education crystalized until, with the support of Tans, he was chosen above a prior favourite to be the University's first Rector Magnificus and *de facto* the Faculty of Medicine's first Dean.⁴⁷¹ Most of the staff involved in the education programme remember a 'friendly',⁴⁷² and 'charismatic',⁴⁷³ but 'distant',⁴⁷⁴ Tiddens who remained aloof from the Education Research and Development unit throughout his short tenure as Dean. Indeed, by

⁴⁶⁴ Henk Schmidt, (*former member of the MFM Department of Education Research & Development*) in interview with the author, at Erasmus University, April 25, 2013.

⁴⁶⁵ Schmidt, in interview with the author, April 25, 2013.

⁴⁶⁶ Peter Bouhuijs, (*former member of the MFM Department of Education Research & Development*) in interview with the author, at Maastricht University, April 16, 2013.

⁴⁶⁷ Knegtmans, *Medische Faculteit Maastricht*, 56.

⁴⁶⁸ Referred to as '1e echelon' by Knegtmans. See Knegtmans, *Medische Faculteit Maastricht*, 56-57 and 63.

⁴⁶⁹ Evert Reerink, (*Founding Faculty Member of the MFM 1973-1979*) in interview with the author by telephone, May 31, 2013.

⁴⁷⁰ 'Basisfilosofie Achtste Medische Faculteit', *Medisch Contact* 27 (1972): 879-84.

⁴⁷¹ Tiddens found himself in the strange position of holding a dual office as Dean of the Faculty of Medicine and Rector Magnificus of the *Rijksuniversiteit Limburg*, which only had one Faculty.

⁴⁷² Henriette 'Hetty' Snellen, (*Faculty Member of the Maastricht Faculty of Medicine 1976-Present*) in interview with the author, at Maastricht University, April 16, 2013.

⁴⁷³ Schmidt, interview with the author, April 25, 2013.

⁴⁷⁴ Pauline Vluggen, (*former secretary of Deans Tiddens, Willighagen and Greep at the Maastricht Faculty of Medicine*) in interview with the author, at Maastricht University, April 22, 2013.

some accounts, Tiddens spent more time in the offices of the WHO and the halls of foreign Medical Schools than in those of his own – a trait remembered with a tinge of frustration by some of his junior staff:

Tiddens was everywhere. And later on, we went everywhere, and wherever we hit a WHO office, you could have a report written by our Dean that he had visited the Faculty and contributed and... but at the same time, *we* were doing the teacher training!! OK? So we had to develop it! From *scratch*! There was nothing.⁴⁷⁵

Tiddens' extensive international involvement spurred Maastricht's somewhat controversial drive for 'community education'⁴⁷⁶ – a commitment which was short-lived in practice, although Maastricht retained the secretariat of the *Network of community-oriented educational institutions for health sciences* for some decades. Like John Evans' time at McMaster, Tiddens' commitment to the *Rijksuniversiteit Limburg* was a short affair, and by 1978 he was already taking his leave before exiting the university completely in 1979.



Prof.dr. Wijnandus H.F.W. Wijnen

Professor of Educational Sciences

*Founding member of the Board of the Rijksuniversiteit Limburg*⁴⁷⁷

The involvement of psychologist Wynand Wijnen in the founding of the Faculty of Medicine in Maastricht marked a definite departure from the all-medical composition of the Education Committee at McMaster Medical School. Indeed, Wijnen had no medical training and was not a clinical doctor, even though he had some experience in working in a medical environment from his work at Groningen University. In 1970, he was invited by the *Koninklijke Nederlandsche Maatschappij tot bevordering der Geneeskunst* (KNMG)⁴⁷⁸ to offer his ideas on the renewal of medical education alongside Harmen Tiddens.⁴⁷⁹

Wijnen's career was an unusual one: after a failed attempt at priesthood, he left his native Limburg in the early 1960s to study psychology at Nijmegen University, and then joined Groningen University's Center for Research on Scientific Education in 1967⁴⁸⁰ – some 300 kilometers North of his region of origin, where he started working on student assessment.⁴⁸¹ How Wijnen went from consultant to the KNMG to one of the most influential persons in the

⁴⁷⁵ Bouhuijs, interview with the author, April 16, 2013.

⁴⁷⁶ Schmidt, interview with the author, April 25, 2013.

⁴⁷⁷ Image courtesy of Henk Schmidt.

⁴⁷⁸ Translates as: Royal Dutch Society for the Advancement of Medicine.

⁴⁷⁹ Knegtmans, *Medische Faculteit Maastricht*, 57.

⁴⁸⁰ Cees van der Vleuten and Henk van Berkel, 'Wynand Wijnen (1934-2012) - een man van betekenis' [Wynand Wijnen (1934-2012), a man of meaning], *Professioneel Begeleiden*. Published February 1, 2013, accessed June 1, 2015. <https://www.professioneelbegeleiden.nl/wynand-wijnen-1934-2012-een-man-van-betekenis>

⁴⁸¹ Henk G. Schmidt, 'Professor dr. Wynand Wijnen (1934-2012)', *Pedagogische Studiën*, 90, no. 1 (2013): 5-7.

shaping of Maastricht's curriculum, above a host of clinicians and basic scientists, remains something of a historical puzzle. Knegtmans mentions the following:

In een aparte nota benadrukte Wijnen, die in 1970 samen met Tiddens zijn ideeën voor de KNMG had ontvouwd en die inmiddels was benaderd om hoofd van het Bureau Onderwijsontwikkeling te worden, dat de in de basisfilosofie genoemde begrippen probleemgerichtheid, zelfwerkzaamheid, attitude ontwikkeling en voortgangsevaluatie nog maar gedeeltelijk hun onderwijskundig nut hadden bewezen [in 1973].⁴⁸²

Quite who did the approaching and why remains untold, but it becomes clear that before the start of the university, Wijnen was the one who firmly held the reins of educational development at the new Faculty of Medicine (MFM). A photograph from a meeting of the *Kernstaf* (Core Staff) in the *Havenstraat* in 1973 shows Wijnen sitting to the right of Dean Tiddens – an accurate pictorial depiction of Wijnen's role during the years to come.⁴⁸³ It seems, according to his own staff of the time, that Wijnen was more of a creative man of abstract ideas who left the day-to-day workings of the Bureau for Educational Research and Development to his junior staff:

He was far more oriented towards the organization or the leaders in the organization. He went two or three times a day to the room of Tiddens. He would never come to our room! I was next door to him! He would not do that.⁴⁸⁴

Wijnen's strange academic habits are in keeping with his odd career path – he was not so interested in publishing his ideas, as his limited publication records indicate – instead, it seems that he enjoyed producing a plethora of indispensable bullet-pointed problem-solving memoranda which he would hand down to various committees for implementation:

He was the golden boy, the first 4 or 5 years. The golden boy. You know, nothing could happen without Wynand. So he was the head of the Education Committee and he would speak with the students [...]. He was witty. And he was always counter-intuitive in his remarks. He wrote, indeed, the short... there was a problem and then he would sit behind his type machine, smoking – he smoked like hell – he would write a one-page solution for that problem and then it would be discussed in the committee.⁴⁸⁵

It was this memo-producing activity and frenzy of educational ideas that placed Wijnen at the heart of the early development of problem-based learning at Maastricht.⁴⁸⁶ Of all of his contributions to problem-based learning, though, the most significant was without a doubt the conception and implementation of the 'Progress Test', of which this treatise will say more in subsequent sections.⁴⁸⁷ Given Wijnen's background and interest in assessment and his

⁴⁸² Knegtmans, *Medische Faculteit Maastricht*, 73. Translates as: In a separate memorandum, Wijnen, who in 1970 had developed his ideas for the KNMG together with Tiddens and who had in the meantime been approached to become head of the Bureau for Educational Development, emphasized that the concepts of problem-orientation, self-directed learning, attitude development and progress evaluation listed in the basic philosophy had to date only partially proven their educational use.

⁴⁸³ Knegtmans, *Medische Faculteit Maastricht*, 77.

⁴⁸⁴ Schmidt, interview with the author, April 25, 2013.

⁴⁸⁵ Schmidt, interview with the author, April 25, 2013.

⁴⁸⁶ The archives of the Faculty of Medicine are replete with his bullet-pointed notes. See for example: Wynand Wijnen, 'Enkele notities ter gedachtebepaling bij de discussie over de "herstructurering van het curriculum a.s. woensdag 22 mrt 1978' [Some notes on thoughts regarding the discussion on 'restructuring of the curriculum' of Wednesday 22nd March 1978] Draft paper from 1978. Rotterdam: Erasmus University, Private Collection of HG Schmidt. Or: Wynand Wijnen, 'Voorstellen betreffende Evaluatie' [Proposal regarding evaluation]. OC 76-011 Memorandum from 1976. Maastricht: Rijksarchief in Limburg, 07.C06.

⁴⁸⁷ van der Vleuten and van Berkel, 'Wynand Wijnen'; Schmidt, 'Professor dr. Wynand Wijnen'.

purported creativity, it comes as little surprise that he was the man to break the assessment deadlock that pervaded at McMaster by devising a test that would circumvent exam-oriented study behaviour while still providing a reliable indication of study progress – so much so that McMaster adopted the test in 1993.⁴⁸⁸

Although Wijnen is remembered for his contribution to assessment in PBL, this overshadowed, according to his colleague Evert Reerink, another more ambitious dream:

[Wijnen] came in at the head of [...] the capacity group for [...] medical education research, but he also had a dream. And that is what in Dutch was called the *algemene faculteit*. The Faculty of General Sciences, which he had to define, work out, and then advertise and struggle to get it. And he found all sorts of stumbling blocks on that way, on that route. [...] Sjeng Tans was his great support, but of course, he was a politician and ending, he made an end of his career and he was sort of replaced in a natural way by other people in that position. And that is the... another problem, and these new *voorzitters*, Chairs of the University, were unable to help Wynand Wijnen with this whole thing so there was all sorts of changes in concept and of course in the programme and then all of a sudden it turned out to be more important to have a Health Sciences Faculty and then they said: ‘OK, we have also lots of general sciences, philosophy and things like that, why not put that in the Health sciences Faculty so that it is not the concern of the Medical School’. And that of course, very much against what the pure concept of a General Faculty of sciences which Wynand Wijnen had in mind. So he appeared to be, sort of - what is it? - disappointed very, very soon. But in the meantime also was able, willing to accept the position of Rector, so he was, what was it, number 2 Rector after Tiddens.⁴⁸⁹

No-one else confirmed this particular account, and it is not entirely clear what this ‘pure concept of a General Faculty’ would entail. But if this was indeed the case, then Wijnen’s educational creativity was even more far-reaching than common accounts let on. As mentioned by Reerink, the idea never took off, besides the founding of the Faculty of Health Sciences in 1980. Wijnen took over from Tiddens as Rector Magnificus of the *Rijksuniversiteit Limburg* in 1979, a position that he held for two years. So how did a psychologist become the man of the moment at a medical school? It seems that Wijnen’s strength came from his drive to overcome adversity and defend his ideas on education:

If you ask the question: ‘why was he influential?’ – then it was not the strength of his publications. Too few. Too scatterry. It was the way he dared to argue. Right? So he... and then he became stronger. So he started weak. Then got opposition and then he had an answer. This is what Cees [van der Vleuten] used to say. That you would go in with good ideas, then he would talk you out of it and then you would draw the conclusion yourself, he didn’t need to say it, that your brilliant idea was a stupid idea. You would admit at the end of the evening. Probably that’s his strength.⁴⁹⁰

Although Tiddens was the Founding Dean of the Faculty of Medicine in Maastricht, Wynand Wijnen was without a doubt the man of problem-based learning, and this part of our historical treatise largely revolves around the debates that ensued from Wijnen’s early ideas on the problem-oriented education, and their later challenge by young education researchers from the Bureau for Educational Research and Development.

⁴⁸⁸ Geoffrey R. Norman et al., ‘Assessment steers learning down the right road: Impact of progress testing on licensing examination performance’, *Medical Teacher*, 32 no. 6 (2010): 496–499.

⁴⁸⁹ Reerink, interview with the author, May 31, 2013.

⁴⁹⁰ Bouhuijs, interview with the author, April 16, 2013.

From McMaster to Maastricht

As indicated in the biography of Harmen Tiddens, it was his breadth of experience with the World Health Organization and his studies at Michigan State University that brought him into contact with John Evans and the McMaster PBL programme in the late 1960s. From there, it seems that he convinced large swathes of people from the Maastricht project to travel to McMaster in May 1974 in order to witness the programme for themselves – according to Knegtman, this included the entire core staff, some of the new employees of the soon-to-be-Faculty, representatives of the *voorbereidingscommissie* (planning commission) and the Ministry of Education and Science, among others.⁴⁹¹ Although the party was impressed by what they saw, the question remains to what extent the programme at McMaster was imported wholesale, or rather transformed to suit Dutch needs. Gerard Majoor, who was among those new employees, answered this question rather categorically:

We went there with planes full of people to McMaster to see how they were doing and we copied their materials. We never used them straight for our education but they gave us examples of how you could do things. But we modified.⁴⁹²

Although we will consider the extent to which this last statement is true further on, we may dwell for a while on the actual relationship between McMaster and Maastricht for a short while, to better understand whether the two schools evolved together or separately. The first and immediately striking point of the relationship between the two is that although the connection was initially made through Tiddens and Evans, by the time the Maastricht delegation arrived in Hamilton, Evans was long gone, and almost nobody was left of the original Education Committee, as we saw in the previous part of this treatise. When asked, the interviewees brought up several prominent names that shaped their encounter with McMaster: Victor ‘Vic’ Neufeld, Howard Barrows, and in later years, Geoffrey Norman. The reader will recognize the name of Howard Barrows, and may also recall that Barrows’ PBL writings were not representative of the original McMaster curriculum. By 1974, in fact, under the leadership of Neufeld, things were well under way to scrap the original ‘biomedical problems’ McMaster curriculum, and bring in a reformed ‘priority health problems’ curriculum, as we shall see later in this treatise.⁴⁹³ It is interesting to remark at this point that whatever version of PBL Maastricht may have gleaned from McMaster, it was not the PBL envisaged by Spaulding, Anderson and colleagues.

Neufeld seems to have been relatively regular visitor to Maastricht – or, in any case, to the Department of Education Research and Development. One of the employees of this department even considered his presence to be indispensable given the lackadaisical involvement of his direct employer, Wynand Wijnen, and Dean Tiddens:

Uncle Vic... Vic made it possible for Henk [Schmidt] and I to survive because it’s killing. You know, your Dean is on the road, Wynand Wijnen became the Dean of the second faculty.⁴⁹⁴

⁴⁹¹ Knegtman, *Medische Faculteit Maastricht*, 88.

⁴⁹² Gerard Majoor, in interview with the author, at Maastricht University, April 22, 2013

⁴⁹³ Alan J. Neville, and Geoffrey R Norman, ‘PBL in the undergraduate MD program at McMaster University: three iterations in three decades’, *Academic Medicine*, 82(4) (2007), 370–374.

⁴⁹⁴ Bouhuijs, in interview with the author, April 16, 2013

Despite the regular mention of his name by interviewees, Barrows appears to have limited himself to sharing his views on PBL through conferences and seminars:

I think [Barrows] was there once, but maybe 2 times. No, I think he was there once. And then I invited him in 1982 after he had invited me to a RIME conference to talk about problem-based learning – I had my first studies done – he invited me and I invited him back for the first symposium on problem-based learning in 1983, I think. So he was the keynote speaker there. So, no, he was not a regular visitor. So it's more the impression that people form about who helped us and then, the reality.⁴⁹⁵

The proceedings of the 1983 conference constitute the only direct contribution of Howard Barrows recorded in the archives. But people from Maastricht who travelled to McMaster did bring back to the Maastricht Faculty of Medicine (MFM) some of Barrows' written contributions to the McMaster programme. For instance, Evert Reerink reported a visit to McMaster in May 1975, in which he referred to the seminar given by Barrows just prior. For the occasion, he brought back the transcript of this seminar to Maastricht and shared it with his colleagues.⁴⁹⁶ His own report is somewhat revelatory of the relationship between the two schools:

Een ander onderwerp van de onderwijscommissie was de tutorrol, die kort in dit verslag zal worden aangegeven en de tutor-training die Vic Neufeldt (sic) wil organiseren. Howard Barrows heeft een vrij complete beschrijving van de capaciteiten van een tutor gegeven. Ik geloof dat wij wel erg zouden schrikken wanneer dit bij ons bekend zou worden als de standaard beschrijving van een tutor. In ieder geval is moeite waard om het te vertalen. Een ander aspect van de tutorrol kwam ik tegen tijdens een bespreking met de groep die fase I herzielt. Er is een duidelijk neiging om de tutoeren in fase I als cruciaal te kenmerken en aan de voorzitter van de planningsgroep van fase I de gelegenheid te geven om zijn eigen tutoeren uit te kiezen.⁴⁹⁷

It is worth noting that what contributions were made by people at McMaster were not taken in wholesale by the Faculty in Maastricht. It seems they blended into the general background of education research and development that was prevalent in Maastricht.

It would be fair to conclude that although there was some cross-fertilization of ideas between McMaster and Maastricht, this was quite a limited phenomenon, and on the whole, Maastricht developed rather independently of its older sister. This still begs the question of the extent to which this allowed Maastricht to develop a different understanding of PBL to the one that prevailed at McMaster. We shall dedicate the rest of this chapter to this task.

⁴⁹⁵ Schmidt, in interview with the author, April 25, 2013. The conference in question actually occurred in 1983 – the conference programme indicates that Barrows was scheduled to give the opening address with the title: 'A specific problem-based, self-directed learning method designed to teach medical problem-solving skills, self-learning skills and enhance knowledge retention and recall'. In addition, he gave a demonstration of the problem-based, small group approach. See Henk Schmidt, 'Symposium on Problem-Based Learning - Program, May 25-27, 1983 - Maastricht, The Netherlands.' Conference Programme from 1983. Erasmus University, Private Collection of HG Schmidt. Rotterdam.

⁴⁹⁶ Howard Barrows, 'Specific Description of the Tutor Role.' OC 75-125. Memorandum from 1975. Rijksarchief in Limburg, 07.C06 - Inventaris 90. Maastricht.

⁴⁹⁷ Translates as: Another topic of the E.C. was the tutor role - and the tutor training that Vic Neufeldt wants to organize. Howard Barrows has given a rather complete description of the capacities of a tutor. I think we would be quite surprised if this were announced as the standard description of a tutor in Maastricht! Another aspect of the tutor role that I encountered during a meeting with the group that is re-organizing Phase I is the clear tendency to see the tutoeren in Phase I as crucial. The Chair of the planning group of Phase I has the opportunity to choose his own tutoeren. He does so by making the process more explicit. - the process by which they are selected is in the front page of the Phase I workbook. In: E. Reerink, 'Opmerkingen gemaakt tijdens een bezoek van 1 dag aan McMaster, Ontario, Canada, 22-5-1975.' OC 75-124. Report from 1975. Rijksarchief in Limburg, 07.C06 - Inventaris 90. Maastricht.

Building an undergraduate programme

The most immediately striking differences between Maastricht and McMaster are the length of the programme and its intended students. Indeed, McMaster, like all North-American medical schools, offered medicine as a post-graduate programme which students would enrol in once they already had an undergraduate degree in something else – preferably in a science-related field, but not necessarily. As a result, the students that attended McMaster were expected to graduate within three years, and they were expected to be somewhat older and more mature than high-school leavers. On the contrary, the Maastricht programme catered to high-school leavers who were admitted on the basis of the peculiar Dutch lottery system of assignment of medical school places and were expected to spend six years studying at the Faculty of Medicine.⁴⁹⁸ These facts had a dual implication: firstly, the programme had to be adapted to a longer study period, and secondly, it had to be adapted to younger students. In this section, we will deal with the organisational and educational implications of a longer curriculum, firstly on the structure of the curriculum, and secondly on PBL problems. In the next section, we will tackle the educational implications of having younger students in tutorial groups.

A longer curriculum

The three-year difference meant that Maastricht needed to conjure a six year-long programme based on the same units, or ‘blocks’ structure that had been seen at McMaster – but they could evidently not simply reproduce the McMaster structure since they were operating over a longer period and with a different target student-base. Where to start? McMaster’s 1969-70 programme had chosen to begin with the so-called ‘Phase I’, which covered the normal structure and function of the human body. The very earliest Maastricht programme did *not* adopt the three McMaster ‘phases’ or indeed its organ-systems based approach – it seems instead that in the first year of the MFM, ‘blocks’ were distributed in a rather haphazard manner, prompting a call for reform before the first year was even through! The programme then tried to integrate the three McMaster ‘phases’ - in 1975, Willighagen and Schmidt drafted a memo in which they proposed to instate a three-phase structure:

Fase 1: Inleiding tot de medische studie. Deze eerst studiefase zou moeten ontstaan uit een samensmelting van elementen uit de ‘oude’ blokken 1, 5 ½ en 9. (...)

Fase 2: Kennismaking met de structuur en de praktijk van de gezondheidszorg. In deze fase zou een integratie tot stand gebracht kunnen worden tussen de ‘oude’ blokken 2 en 3 en elementen uit 8. (...)

Fase 3. Kennismaken met klinische problemen. Tijdens het koördinatoren overleg werden de mogelijkheden tot integratie van de studieeenheden V, VI, VII en VIII besproken. Hieruit werd de idee naar voren gebracht deze 4 blokken samen te voegen tot een grotere eenheid, die voorlopig fase 3 werd genoemd.⁴⁹⁹

⁴⁹⁸ Until 2000, all Dutch medical students were admitted on the basis of a lottery weighted by grade point average. See: Cathleen Stasz, and Christian van Stolk, ‘The Use of Lottery Systems in School Admissions’. WR-460-SUT. RAND Europe, (2007), accessed June 9, 2015, 7.

http://www.rand.org/content/dam/rand/pubs/working_papers/2007/RAND_WR460.pdf

⁴⁹⁹ Roelof Willighagen and Henk Schmidt, ‘Voorstel tot opbouw van een (zoveel mogelijk) geïntegreerd 1e studiejaar 1975-1976’ [Proposal for the build-up of an (as far as possible) integrated 1st year of study 1975-1976] OC 75-115 Memorandum from 1974. Rijksarchief in Limburg, 07.C06 - Inventaris 89. Maastricht. The document is dated from May 1974 but it is probable that this is an error and it was actually from May 1975. Translates as:

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This plan did not hold up much longer than the first, and by 1977, the MFM used a mixture of a life-cycle and a health complaints approach, with each block either representing a set of complaints, or a period in a person's life. This is a summarized overview of the curriculum as dating from 1977:

Year 1					
1.1. Studying in the MFM	1.2. Trauma	1.3. Infections & Inflammation	1.4. Psycho-somatic reactions	1.5. Artheo-sclerosis	1.6. Cancer & Introduction to the clinic
Year 2					
2.1. Embryo & Foetus	2.2. The Child	2.3. The Teenager	2.4. The Adult	2.5. The Elderly	2.6. Experiencing a professional setting
Year 3					
3.1. Fatigue	3.2. Fever, infection & Inflammation	3.3. Breathlessness & Chest Pain	3.4. Lifestyles	3.5. Blood Loss	3.6. Electives
Year 4					
4.1. Stomach complaints	4.2. Menstruation complaints & complications in pregnancy	4.3. Headaches / loss of consciousness & neurological / psychiatric problems	4.4 & 4.5. Electives		4.6. Back ache & aches in legs and arms
Year 5 – Clinical Internships					
12 weeks internship in primary care / family practice		20 weeks clinical internship			8 weeks psychiatry
Year 6 – Clinical Internships					
8 weeks gynaecology	4 weeks neurology	6 weeks paediatrics	3 weeks dermatology	3 weeks otorhinolaryngology	3 weeks ophthalmology
12 weeks clinical elective					

Table 12: The Maastricht Medical Curriculum in 1977⁵⁰⁰

The reader will note that the first block comprised an introduction to medical studies. This was obviously intended to familiarize fresh students with both the content and educational process

Phase 1: should be an introduction to medical studies. The first study phase should be a melting pot of elements from the old blocks (...)

Phase 2: Introduction to the structure and practice of health care. In this phase there will be an integration of block 2, 3, and elements of 8. (...)

Phase 3: Introduction to clinical problems. Integration blocks 5,6, 7, 8. The coordinators of these 4 study units and some other members of these planning groups came together on May 15th 1975, they discussed the problems of a multidisciplinary approach, the logistical problems such as working in labs and in the hospital, the place of block 4 skills and the proposal for a new planning group.

⁵⁰⁰ This curriculum outline is extracted from a German magazine which reviewed the programme in 1977. It is the earliest complete curriculum outline that was available from the archives, and given that the programme had been going for only 3 years, it may be one of the earliest complete curricula available. See E. Michel-Alder, 'Nicht die Krankheit steht im Zentrum - sondern die ihrer Gesundheit gestörte Person' [The diseases not in the centre – but the health of the patients], *Tages Anzeiger Magazin*, (46) (1977), 34. The later curriculum outline of Knegtmans from 1983-84 already shows some shifting around of the curriculum, see Knegtmans, *Medische Faculteit Maastricht*, 207.

of the medical curriculum. The final two years were made up of various clinical internships, which meant that four full years were dedicated to the PBL blocks, twice as long as was used at McMaster.

The problem of problems

Given that the McMaster units were entirely different to the Maastricht blocks, it follows that the problems used as triggers in the tutorials could not have been copied over to Maastricht. Perhaps they might have been adapted to fit the complaints and phases-of-life format, but in this case there would not have been enough problems to go around the four years of the PBL programme at the MFM. One might think that given the abundance of time that Maastricht had compared with its Canadian counterpart, it might offer lengthier problems – but according to two independent interviewees, this was not the case:

I think that right from the start, we had major differences in the type of problems that we used. Which is... the education differences that arose from the original problems at McMaster that needed to be lengthy problems and that was not taken over in Maastricht. We made much smaller problems, which I think were less realistic but also didn't induce cognitive overload. I think it was more in line with educational theory.⁵⁰¹

This account was confirmed by another contemporary:

For instance in McMaster, I think [...] they would spend a month on a case. And from the start we decided to chop up education in much smaller bits and a case would serve only for a week or two weeks, no longer. We didn't copy the McMaster programme. It was making a kind blueprint, as we call it, an outline of the undergraduate curriculum with topics that we felt needed to be dealt with.⁵⁰²

Below is an example of what such a 'shortened' problem looked like, extracted from a student training manual from 1976.⁵⁰³

Maastricht Problem Sample from 1976

Running: You are awfully late this morning. When the bus stop comes into view you look behind and see the bus coming in the distance. You begin to run; the effort is no problem at first. After a hundred yards, however, your respiration quickens and when you have covered another hundred yards, you feel your heart starting to bump at a rapid rate. A moment later, you begin to sweat. As the bus passes by, you have a weak feeling in your arms and legs, almost as of pain. You stop running and walk slowly. In spite of the fact that you are no longer running you are still breathing quickly and deeply and you feel your heart thumping in your throat. These phenomena decline in a matter of two minutes.

For all intents and purposes, Maastricht started with a blank slate on problems, and decided to go very much its own way, even in the naming of 'problems'. Perhaps they considered that shorter problems would be easier to handle for young and inexperienced students. It may seem strange to the reader that the MFM, which avowedly borrowed the idea of problem-based learning from McMaster University at a time when the latter had already baptised their method

⁵⁰¹ Cees van der Vleuten (*Head of the department of Education Research and Development at MFM since the 1990s*), in interview with the author, at Maastricht University, April 15, 2013

⁵⁰² Majoor, in interview with the author, April 22, 2013

⁵⁰³ Original Dutch text is from 1976, but this problem is extracted from a translation from 1979 – Henk Schmidt, Gerard Majoor, and Wynand Wijnen, 'Introduction to the medical study.' Booklet from 1979. Erasmus University, Private Collection of HG Schmidt. Rotterdam, the Netherlands.

‘problem-based learning’, used a plethora of descriptors for at least the first fifteen years - none of which were ‘problem-based learning’.⁵⁰⁴ The method was labelled *probleem-georiënteerd onderwijs* (problem-oriented education), *onderwijs in taakgerichte groepen* (education in task-directed groups), and finally *probleemgestuurd onderwijs*, a denominator still widely used in the Netherlands, even though it translates as ‘problem-driven education’. Was this an attempt to differentiate itself from McMaster? The historical evidence suggests that this is unlikely. Indeed, given the historical period, it was uncommon at the time for English words to be used directly in the Dutch terminology, and it is thus not surprising that the founders used a rough translation instead. The term *probleem-georiënteerd onderwijs* first appeared in the *basisfilosofie* of 1972 but one must remember that this founding document was published ere the pivotal visit to McMaster – it would thus have marked a more general educational wish rather than pointing specifically to the McMaster model.⁵⁰⁵ The second moniker, *onderwijs in taakgerichte groepen*, was a contraction invented by the authors of a 1980 publication of the same name,⁵⁰⁶ at the behest of their publisher, who believed the name would make for a more marketable book than talk of ‘problems’ – according to one of the authors of said book.⁵⁰⁷ In fact, a previous journal article by the same authors referred to problem-oriented education instead.⁵⁰⁸ The change to ‘problem-driven’ education, has no clear-cut explanation. However, a report from the Working Group on *probleemgestuurd onderwijs* from 1990 gives us a clue as to the reasoning behind this name-change:

Definitie PGO

Er is enige spraakverwarring rondom de afkorting ‘PGO’. Verschillende omschrijvingen worden gebezigd: probleem-georiënteerd onderwijs en probleemgestuurd onderwijs, of probleem gestuurd leren. Helderheid in deze terminologie is gewenst. Het gaat om verschillende betekenissen:

- A. de term probleem-georiënteerd onderwijs (‘problem-oriented learning’) houdt consequenties in voor de inhoud van het curriculum: leerinhouden worden thematisch gordend (in tegenstelling tot disciplinair).
- B. De term probleemgestuurd onderwijs (‘problem-based learning’) heeft betrekking op de methodiek en houdt consequenties in voor de vormgeving van het leren (begeleidingsvormen, toetsvormen, programmering).
- C. De term probleemgestuurd leren heeft (net als b) betrekking op de methodiek. Met ‘leren’ wordt de studiegerichtheid aangegeven.

Deze drie aspecten zijn van belang: het onderwijs wordt immers gekenmerkt door praktijkoriëntatie, probleemsturing en studentgerichtheid. Voor de duidelijkheid: de RL gebruikt de term Probleem Gestuurd Onderwijs.⁵⁰⁹

⁵⁰⁴ The reader will recall a 1974 paper to that effect: Victor R Neufeld, and Howard S Barrows, ‘The “McMaster Philosophy”: An Approach to Medical Education’. *Journal of Medical Education*, 49 (1974): 1040–1050.

⁵⁰⁵ ‘Basisfilosofie’

⁵⁰⁶ Henk G. Schmidt, and Peter A.J. Bouhuijs, *Onderwijs in taakgerichte groepen* [Education in task-oriented groups] (Utrecht: Spectrum: 1980).

⁵⁰⁷ Schmidt, in interview with the author, April 25, 2013.

⁵⁰⁸ Henk G. Schmidt, ‘Probleem-georiënteerd onderwijs: leren aan de hand van problemen’, *Metamedica*, 57, no. 1 (1978): 4-16.

⁵⁰⁹ Translates as:

3.3.1. Definition PGO: There is some semantic confusion surrounding the abbreviation PGO. Different descriptions are used: problem-oriented education and problem-based education or problem-based learning. Clarity in this terminology is desirable, it refers to different meaning.

A. the term problem-oriented education contains consequences for the content of the curriculum (in contrast to disciplinary divides).

However, since there is no evidence of such in depth semantic considerations in the 1970s, we might also assume that this is a convenient post-hoc reconstruction to tackle the problems that come with the internationalization of terminology in an ever-globalizing educational world – and in fact, one might even go so far as to say that Maastricht did not give particular thought to the specific terminology it used to describe its education in the 1977 – sometimes problem-oriented, sometimes problem-driven, and when speaking or writing in English, problem-based. All of the interviewees with no exceptions considered that they were doing ‘problem-based learning’. As former Maastricht education researcher Erik de Graaff put it: ‘The way I remember it was never an issue in Maastricht. We knew what we were doing’.⁵¹⁰

Beyond the differing curriculum structure and problem-configurations, the other major implication of creating an undergraduate programme was that instead of austere faces of mature twenty-somethings with years of university experience under their belts, the founders of Maastricht found themselves confronted with fifty bright-eyed and bushy-tailed teenagers straight out of high school when they opened the first classes in September 1974. This very fact alone coloured the entire conception of the Maastricht programme and one might legitimately ask oneself – could an eighteen-year-old survive in the sort of unstructured free-for-all PBL *à la* Anderson? The answer, according to the *onderwijscommissie* (Education Committee; OC), was: ‘nee’. These students needed structure, training, and guidance, and since these were not built into the McMaster model, Maastricht was going to have to create these from scratch. To do this, they first had to remodel the PBL tutorial.

Re-inventing the tutorial process

We have described the changes to the structure of the programme at Maastricht made to accommodate a longer medical education. We will now consider the educational implications of remodelling the PBL tutorial model. This presented a substantial challenge to the Educational Development and Research team of Maastricht on several levels – firstly, at the theoretical level, because the original thoughts and ideas behind the McMaster tutorial were not available to them: neither the musings of Evans on Addison nor the soliloquies of Spaulding on Comenius could serve to provide context. Therefore, given that the (albeit limited) philosophical backdrop of the first Educational Committee of McMaster could not be transferred to Maastricht, the latter had to find another intellectual and practical anchoring for its re-interpretation of the tutorial. Secondly, at the practical level, Maastricht rapidly faced the

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- B. The term problem-based education relates to the methodology and has consequences for the design of the learning (modes of guidance, assessment formats and planning)
 - C. The term "problem-based learning" (like B) refers to the methodology. The term "learning" indicates the study orientation.

These three characteristics are important: education is characterized by practice-orientation, problem-direction and study-orientation. For the sake of clarity, the RL uses the term *Probleem Gestuurd Onderwijs*. In: Werkgroep PGO, ‘Probleem Gestuurd Onderwijs - Eindrapport van een werkgroep Rijksuniversiteit Limburg’ [Problem-based learning – End report of the working party of the State University of Limburg] Report from 1990. Erasmus University, Private Collection of HG Schmidt. Rotterdam, the Netherlands, 4.

⁵¹⁰ Erik de Graaff, *in correspondence with the author*, November 2, 2014.

need to implement a kind of learning structure that was almost anathema to the *ad hoc* tutorials run at McMaster.

From pedagogical improvisation to structured training

Unlike McMaster, which had simply thrown students in the deep end of small-group self-directed learning, the OC unanimously recognized that some form of group training was necessary for the young students coming in to the first cohort of the Faculty of Medicine. In February 1974, social psychiatrist Marius Romme travelled to Toronto to enlist psychiatrist Norman Bell to help the OC devise a strategy for training students to work in tutorial groups.⁵¹¹ Shortly after this encounter, Bell produced an outline for a year-long student training programme focused on the idea of the ‘self-analytic group’ – a theme very much anchored in the traditions of sensitivity training and psychoanalysis, at the crossroads between Rogers and Freud. Bell summarized the objectives of the programme as follows:

In general terms the goals of the program are to:

1. Familiarize the student with group phenomena
2. Foster an understanding of a group as a system with a structure and functions.
3. Communicate a language for describing-understanding groups.
4. Expose students to some techniques for the systematic approach to groups.
5. Orient students to the availability of literature regarding groups.⁵¹²

Such a programme was based on the assumption that self-directed learning required a considerable amount of introspection, and the process recounted in the Bell programme outline is reminiscent of the T-groups that lay at the heart of Carl Rogers’ writings.⁵¹³ The programme reads as follows:

1. A small (6-10) group, together with a trainer, explores the nature of processes confronting all groups, such as commitment, authority and leadership, closeness and distance, task and social activities and harmony and conflict.
2. The group uses as material for study the most detailed real-life available material, - its own interaction. To be useful and used, the interaction needs to be recorded.
3. Such groups almost always involve a struggle to find a workable solution to the issues confronting all groups. The trainer promotes these processes by functioning as a catalyst, a commentator, a resource person and a friend.
4. Such groups almost always evoke strong feelings - positive or negative, or both. If there is a readiness and ability to tolerate such feelings, the experience is compelling and revealing for most individuals.⁵¹⁴

According to notes left by Bell in 1975, after some preparation, the programme began in October 1974. Some say that this was the first training programme,⁵¹⁵ others say that it was simply stitched onto a pre-existing loose training programme consisting of six groups with no

⁵¹¹ This is recounted in a paper by Bell, undated but assumed to be written in 1975 : Norman Bell, ‘Review of on-going group program, M.F.M., 1974-75. OC 75-019.’ Report from 1975. Rijksarchief in Limburg, 07.C06 - inventaris 90. Maastricht.

⁵¹² Bell, ‘Review of on-going group program’.

⁵¹³ T-groups, or ‘training groups’, or also ‘sensitivity-training groups’ was a form of group discussion pioneered by Carl Rogers with the objective of encouraging sensitivity in interpersonal relations through verbalization of issues. For a description of T-groups see Carl Rogers, *Freedom to learn*. (Columbus, Ohio: C. E. Merrill Pub. Co. 1969)

⁵¹⁴ Bell, ‘Review of on-going group program’

⁵¹⁵ Henk Schmidt, *in correspondence with the author*, June 18, 2015.

particular goal or direction.⁵¹⁶ What is clear is that from the very beginning students expressed dissatisfaction and the programme was reviewed to comprise a looser structure as early as November 1974.⁵¹⁷ It was reviewed and refocused again in January 1975, but a letter exchange from February 1975 reveals that the OC considered the programme a failure: in said letter, OC secretary Roomans complained of ‘stagnation’ in the training groups, the cause of which needed to be unearthed.⁵¹⁸ Bell himself suggested potential causes for the programme’s shortcomings – perhaps, he offered, the Maastricht students needed more time than was customary to ‘wrestle with the nature of their commitment and responsibility’, or perhaps it was the small size of the MFM that interfered with his sensitivity training, but mostly, lack of time, appropriate location and resources might have been to blame.⁵¹⁹ In April 1975, the ‘Sub-commission on the Evaluation and Training Groups’ advocated a complete reform of the programme: they divided it into a two-phase proposal in which the first phase, towards the beginning of the year, would be more compact and structured, and the second phase would be ‘on-going’ toward the second half of the year.⁵²⁰ While still holding on to the Bell goals and objectives, said sub-commission placed psychiatrist Lex van Bommel in charge of overseeing the new programme. Thus was born the second attempt at providing students with training in a PBL environment, under the aegis of ‘group dynamics’.⁵²¹ Like its predecessor, this programme was a failure. In 1976, a letter of rebellion was sent to the OC from a discontented group of students who took arms against the van Bommel programme, and demanded change:

T.a.v. de training: De training moet als hoofddoel hebben het kunnen gebruiken van dit leermiddel in het kader van de Maastrichtse faculteit (dus inclusief de vier basisprincipes!) Wij denken aan de volgende globale uitwerking:

- De training zou onder andere gericht moeten zijn op de volgende vaardigheden: het zich bewust worden van hetgeen zich afspeelt in een dergelijk groep; het leren zien van rol, die het eigen gedrag daarin speelt; het zien van de functies die vervuld moeten worden om gestelde doel te bereiken; het leren hanteren van vergadertechnieken m.b.t. gespreksleider, notulist, agenda etc.; het aanleren van vaardigheden, nodig om een ontspoord groepsgebeuren weer in betere banen te leiden.
- De training zou als volgt uitgevoerd kunnen worden: er moet bij het begin van de studie of het werkverband een training komen, waarvoor een paar weken dienen te worden uitgetrokken. Deze training dient ook aangeboden te worden aan alle reeds aanwezige studenten en tutoren. Er dient daarna een behoorlijk vervolg gerealiseerd te worden, die zich over het hele jaar uitstrekt.
- Bij de uitvoering van dit geheel moet beslist nagegaan worden wat er in het gehele land aan capaciteit aanwezig is voor dit soort trainingen. Ook dient voldoende vakdeskundigheid op dit terrein binnenhuis gehaald te worden.⁵²²

⁵¹⁶ Max Beekers, *in correspondence with the author*, June 23, 2015.

⁵¹⁷ Bell, ‘Review of on-going group program’, 2-3.

⁵¹⁸ F. Roomans, ‘Letter to Prof. Dr. Norman Bell - 19 February 1975.’ OC 75-024 Letter from 1975. Rijksarchief in Limburg, 07.C06 - inventaris 90. Maastricht.

⁵¹⁹ Bell, ‘Review of on-going group program’, 4.

⁵²⁰ R. Hulsmans, and M. Mommers, ‘Letter to the Education Commission - 25 April 1975.’ OC 75-096 Letter from 1975. Rijksarchief in Limburg, 07.C06. Maastricht.

⁵²¹ Lex van Bommel, ‘Bijlage advies van de subcie "evaluatie en planning trainingsgroepen" aan de onderwijscommissie’ [Appendix advice to the education commission of the sub-commission ‘evaluation and planning training groups’], OC 75-097 Memorandum from 1975. Rijksarchief in Limburg, 07.C06 - inventaris 90. Maastricht.

⁵²² Translates as: Regarding the training, it should have as a main goal to be able to use the learning materials in the framework of the medical faculty - including the four basic principles. We are thinking of the following general implementation:

- The training should, among other things, be aimed at the following skills: becoming aware of what takes place in such a group, learning to see the role that your own behaviour plays in this, seeing the functions that have to be

As the letter reveals, it was out with sensitivity training and group dynamics, and in with specific role-oriented, process-oriented training. Bell was duly disregarded, but to acquiesce to the students' demands, the *onderwijscommissie* needed to develop its in-house training expertise. This task fell into the hands of Henk Schmidt and Peter Bouhuijs, then both young education researchers at the MFM's Department of Education and Research.

Peter Bouhuijs indicated that at first, the pair had little idea how to go about this training – they began with one-day trainings in which groups of six to eight students would tackle a series of problems, and would be tape-recorded so-doing such that they might critically evaluate their performance afterwards.⁵²³ After a year of experimentation, Schmidt indicated in a training document from 1977 that the in-house training had progressed towards a more sophisticated assortment of techniques:

In September zal een training van eerstejaarsstudenten plaatsvinden die elementen zal bevatten van de tutortraining zoals het boekje, videobanden en de groepssimulatie. (...) Tijdens de groepssimulatie zullen enkele rondes gedaan worden met een directe feedbacktechniek, waarbij de studenten pas een bijdrage mag leveren aan de discussie nadat hij een samenvatting heeft gegeven van datgene wat de student voor hem gezegd heeft.⁵²⁴

In addition, the training load was also shared over more faculty, making the training less of an *ad hoc* and more of an institutionalised process.⁵²⁵

A new type of tutorial group?

The McMaster tutorial, as described by Anderson in chapter 1, only had four to five students, working in an *ad hoc* fashion with a tutor who was a sort of guide, mentor, process monitor and knowledge broker rolled into one. It is unlikely that all of the actual tutorials at McMaster matched Anderson's humanist ideal, but as we have seen, Reerink had already remarked on the

fulfilled to reach the set goal, working with group work techniques with regards to the roles of chair, scribe and agenda-setting, learning the skills necessary to bring a group that has derailed back on track.

- The training could be implemented as follows: there should be a training at the beginning of the study or the appointment that should last a couple of weeks. This training should also be offered to all students and tutors that are already here. They should also have a proper follow-up that stretches throughout the year.

- In the implementation of this whole, they should research what sort of capacity is available in the entire country for these trainings. They should also attract enough in-house content expertise in this field.

In: P. Pasmans, et al. 'Voorstellen aan de Onderwijscommissie inzake het beleid t.a.v. onderwijsgroepen', [Proposals to the education commission regarding the policies on education groups] OC 76-097. Memorandum from 1976. Rijksarchief in Limburg, 07.C06 - inventaris 90. Maastricht.

⁵²³ Bouhuijs, in interview with the author, April 16, 2013.

⁵²⁴ Translates as: In September there will be a training for the first year students, that contains elements of the tutor training like the booklet, the video tapes and the group simulation. [...] During this group simulation, there will be several rounds in direct feedback techniques in which the students can only take part in the discussion if he gives an elaborate summary of what the student before him has said. In: Henk G Schmidt, 'Voorstel tot het opstarten van een projekt "tutorsysteem"'. *Kursus Probleemgeorieerd Onderwijs* [Proposal for the launch of a project 'tutor system'. Course in problem-oriented education], OC 78-116. Booklet from 1977. Rijksarchief in Limburg, 07.C06 - Inventaris 98. Maastricht.

⁵²⁵ A text by Henk Schmidt from 1977 indicates that the following people were involved: Anton Schmidt, Peter Bouhuijs and Henk Schmidt and to a lesser extent, Max Beekers, Jos Bremer and Rutger Lulofs. In total, they conducted five training courses in 1976-77 with 70 members of faculty and students. In Henk G Schmidt, 'Tutortraining - De Taken van de Tutor' [Tutor training, the tasks of the tutor], OC 77-164. Memorandum from 1977. Rijksarchief in Limburg, 07-C06 - inventaris 98. Maastricht.

difference between the McMaster and the Maastricht tutorial when he visited the former in 1975.⁵²⁶ Schmidt confirmed the peculiarities of the McMaster tutorial:

I have seen videos of tutorials at McMaster, somewhat later. And they were totally tutor- driven. So the tutor was in the middle, they were looking at the tutor and they were talking to the tutor. But I must say these were the videos with Howard Barrows.⁵²⁷

To understand the development of the tutorial at Maastricht, one should bear in mind the description given by Bouhuijs: ‘we learnt from Wynand Wijnen that it should be as teacher independent as possible’.⁵²⁸ The educational puzzle faced by the Department of Education Research and Development was therefore how to achieve said teacher-independent problem-based education with students straight out of high school. A free-for all discussion would be manageable with a tutor as moderator, but if the tutor was to take a step back, how would the students handle the problems? After a couple of years of muddling with sensitivity-oriented techniques *à la* Norman Bell, which basically amounted to letting the students deal with the problems on their own, a solution was introduced by Henk Schmidt in 1976 – the so-called ‘Seven Jump method’.⁵²⁹

The ‘Seven Jump’ Method	
Step 1	Clarify terms and concepts not readily comprehensible.
Step 2	Define the problem.
Step 3	Analyze the problem.
Step 4	Make an inventory of the explanations inferred from step n°3, proceeding systematically.
Step 5	Formulate learning-objectives.
Step 6	Collect additional information outside the group
Step 7	Synthesize and check the newly acquired information

The ‘seven-jumps’ were a reference a traditional Dutch children’s song *De Zeven Sprong*. There is no grand philosophy behind this name, Schmidt merely thought that it would be amusing to baptise his method by the folk song’s name.⁵³⁰ In the course of PBL’s history, it has become known as the ‘seven-step method’, a more descriptive, if somewhat less picturesque appellation. In 1980, the method made its way to the public through the publication of *Onderwijs in Taakgerichte Groepen*,⁵³¹ and by 1981, the seven-steps had become something of an institution in Maastricht PBL education, with its own ‘how-to’ manuals for students and tutors, and evaluation forms for tutors to use with their groups.⁵³²

It is important to understand the original idea of the seven-jumps, since this method appears to have taken on multiple forms in institutions all over the world, each spawning their own terminology for the steps, which number anything between 3 and 10, depending on which PBL

⁵²⁶ Reerink, ‘Opmerkingen gemaakt tijdens een bezoek van 1 dag aan McMaster’.

⁵²⁷ Schmidt, in interview with the author, April 25, 2013.

⁵²⁸ Bouhuijs, in interview with the author, April 16, 2013

⁵²⁹ In Schmidt, Majoer and Wijnen, ‘Introduction to the medical study.’ This is an English translation from 1979 from the student introduction booklet of 1976, which was originally in Dutch.

⁵³⁰ Schmidt, in interview with the author, April 25, 2013.

⁵³¹ Schmidt and Bouhuijs, *Onderwijs in taakgerichte groepen*, 51.

⁵³² Henk Schmidt, ‘Mededeling 4’ [Communication 4] Memorandum from 1981. Erasmus University, Private Collection of HG Schmidt. Rotterdam, the Netherlands.

practitioner one asks. As listed by Schmidt in the 1976/9 Introduction to the Study of Medicine,⁵³³ the purpose of the steps was as follows (in italics, direct quotes from the booklet, followed by a brief explanation):

- *The first activity to take place is the clarification of such term and concepts in the problem as are not easily understood.* This could be done either with the group members' prior knowledge or by using a dictionary. It appears very clearly that the purpose of this first step was not to produce a list of definitions, but to ensure that the whole group attuned their interpretation of the problem.
- *The second step covers the exact definition of the problem.* In the booklet, the authors indicate that this does not mean that the students should propose a precisely defined list of questions, but instead should agree on which phenomena in the problem trigger need to be explained.
- *Attention subsequently centres on problem analysis.* In this phase of the problem study, the authors suggest that students recapitulate their opinions, thoughts, ideas and actual knowledge on the problem based on their prior knowledge. The booklet refers to this technique as 'brainstorming', and stresses that all group members' contributions should be taken into account.
- *In the fourth step an inventory is made of the various explanations of the problem brought forward.* The authors recommend a schematic depiction of this analysis on a blackboard. The purpose is to 'marshal' and 'summarize' the contributions of the problem analysis.
- *The fifth step requires the formulation of learning issues.* These should answer the unknowns left open after the first four steps.
- *The sixth step is meant to promote individual study. The group members collect additional information outside the group.* Not only were students expected to make use of books and audio-visual aids, but they should also reach out to content experts within the Faculty.
- *The 'Seven-Jump' is completed by synthesizing and checking the newly acquired information.* This meant that students should inform each other about their findings, attempting to describe precisely the processes at play in the problem.

With such a structure, the students could theoretically handle any problem systematically – such a detailed description of the learning process would never have been found at McMaster, but became the very hallmark of the Maastricht tutorial, still taught there to this day.

The mere introduction of the Seven-Jump still did not resolve the role of the tutor in the tutorial – indeed, a tutor could very well lead the discussion, even with the new structure. This is why Schmidt also introduced the role of the 'Student Chair' and the 'Student Scribe'.

Chronologically, the role of the Chair was defined first. The earliest record of this role can be found in the presentation of the *Tutorensysteem* (Tutor System) in 1976. In this document, the role is referred to as *gespreksleider* (discussion leader) and *vergadervoorzitter* (discussion

⁵³³ Introduction written by Henk Schmidt in: Schmidt, Majoor and Wijnans 'Introduction to the medical study', II-V

chair) interchangeably.⁵³⁴ Interestingly, it is not explicitly mentioned that the role should be assigned to a student, but merely implied. In a document related to the *Tutorsysteem*, Schmidt elaborates on the functions associated with chairing:

Een gespreksleider:

1. gaat vooraf na welke punten er tijdens de bijeenkomst aan de order moeten komen en stelt voor zichzelf een agenda op;
2. Checkt aan het begin de groepsleden na of de agenda compleet is;
3. Houdt de tijd in de gaten zodat alle agendapunten aan de orde zijn geweest binnen gestelde tijd;
4. Deelt spreektijd toe en beperkt ze;
5. Bemoeit zich niet inhoudelijk met de discussie;
6. Geeft zo nu en dan een samenvatting van het gezegde om de discussie wat te structureren.⁵³⁵

Point five is strongly emphasized in the document – not only should the Chair not interfere with the content of the discussion, but he is literally *verboden* (forbidden) from doing so! His role is merely procedural – he keeps order in the meeting – and recapitulating – he summarizes in between other members’ contributions. Remarkably, the document suggests that the Chair himself also keep minutes of the meeting, indicating that the Scribe as an independent role is a later invention. However, neither the archives nor our interviewees could trace the precise introduction of the role of the Scribe as a distinct function from that of the Chair. In this way, Maastricht differed markedly from McMaster – not that McMaster explicitly required the tutor to be the discussion leader, but neither did it specifically bestow the role upon a student member of the group.

‘Anybody can be a tutor’

As we have seen, for reasons both pragmatic and circumstantial, McMaster instated a policy of ‘non-expert tutors’. The meaning of this phrase has caused much stir in the lore of PBL since, legends abounding that literally anybody could be a tutor. Those myths would clearly not have come from McMaster – as we have seen, while it was true that cardiologists did not tutor units on blood circulation, it was still the case that tutors were medical doctors; they were merely not tutoring in their field of medical expertise. There is quite a jump to make from there to assuming that PBL can be managed by any layperson. Geoffrey Norman indicated that

⁵³⁴ Only the second edition of this proposal was available: Henk G. Schmidt, ‘Het Tutoresysteem (2e Druk)’ [The Tutor System, 2nd Edition], Report from 1977. Erasmus University, Private Collection of H.G. Schmidt. Rotterdam, the Netherlands.

⁵³⁵ Translates as:

The Chair:

1. Before the meetings, he will look at which points need to be added to the agenda of the meeting.
2. At the beginning of the meeting he will look at whether the agenda is complete according to the students.
3. He will keep an eye on the time.
4. Will assign speaking time and restrict it.
5. Will not interfere with the content of the discussion.
6. Time and again, will give a short summary of what has been said.

In: Henk G. Schmidt, ‘Rapportage van de projectgroep Tutortraining’ [Report from the project group tutor training], OC 76-192. Report from 1976. Erasmus University, Private Collection of HG Schmidt. Rotterdam, the Netherlands.

Maastricht might be the source of this belief.⁵³⁶ This section will therefore attempt to unearth the fact of the matter.

Indeed, legend has it that at Maastricht, ‘even secretaries [...] were tutors’.⁵³⁷ This belief seemed quite pervasive among the people interviewed for this treatise, even though Schmidt denied it categorically:

I think that was nonsense. That is lore. I cannot remember any secretary... I mean, sometimes somebody would say: ‘everybody can tutor, even secretaries’. There were never actual secretaries doing this. But there were lab assistants.⁵³⁸

One person’s word against another’s, it would be impossible to come to a conclusion on the matter, were it not for several reliable historical records detailing with some precision the sort of person who might be hired to be a tutor. In 1977, the MFM held an internal education conference to discuss some of the pressing issues regarding the educational aspects of the medical programme. The proceedings show that the topic of tutor qualifications arose during the talks:

Tutor

- Een jaarploeg van vaste tutores (zie voorstel jaarcoördinator 4^e studiejaar) is wenselijk.
- De tutor dient een zekere inhoudskundigheid te hebben
- De tutor moet beter en meer bij het onderwijsgebeuren betrokken worden.
- Meer onderzoek, (...) dient er te gebeuren, ook voor andere (latere) studiejaar.
- Tutor kunnen zijn alle stafmedewerkers (WP-ers), studenten en die technische/ administratieve medewerkers die door de capaciteitsgroep worden voorgedragen.
- Voor het 4^e studiejaar zouden bij voorkeur medici moeten tutores.
- De tutor dient een integraal inzicht te hebben in de problematiek van de geboden onderwijsstof van een blok; hij moet deelproblemen herkennen van het aangeboden probleem. Deze “inhoudskundigheid” van de tutor ligt op een duidelijk ander niveau, dan die van de echte inhoudskundige.
- Feedback moet gegeven worden omtrent het functioneren als tutor.⁵³⁹

These notes are somewhat confusing and self-contradicting. On the one hand, they call for tutors to possess a certain content expertise, but on the other hand, they propose that all ‘scientific employees’ but also students and technical administrative employees be eligible to

⁵³⁶ Geoffrey Norman (*Research Assistant to Victor Neufeld and Howard Barrows at McMaster in 1971*) in interview with the author, at McMaster University, October 20, 2012

⁵³⁷ Snellen, in interview with the author, April 16, 2013

⁵³⁸ Schmidt, in interview with the author, April 25, 2013.

⁵³⁹ Translates as: 2. Tutor

- A yearly group of set tutors is desirable. See proposal of year coordinator for 4th study year.
- A tutor should have a certain content expertise
- A tutor has to be more and better connected to the education
- More research [...] has to happen for later study years.
- Tutors can be all staff employees (scientific employees), students, and technical administrative employees that are proposed by the capacity group.
- The fourth study year should be preferably taught by medical doctors.
- A tutor has to have an integral insight into the problems of the offered curriculum of a block. He has to recognise sub-problems of the problem, the expertise of the tutor is clearly of a different level than that of the real content expert.
- Feedback has to be given regarding the functioning of the tutor

In: ‘Onderwijsconferentie 7-3-1977’ [Education conference 7-3-1977], OC 79-239 Proceedings from 1977. Rijksarchief in Limburg, 07.C06 - inventaris 94. Maastricht.

tutor! In the light of this, it is understandable that our interviewees were somewhat confused on the subject – it seems Maastricht could hardly produce a coherent policy itself in 1977! By 1979, however, it seems that matters had settled against students and technical staff, and in favour of ‘scientific staff’. A letter from the ‘Tutor-system Project Group’ to the Chairman of a Department (the department is not specified) of the MFM dated from 1979 stated the following:

De tutorrol kan in principe vervuld worden door iedere medewerk(st)er uit de categorie wetenschappelijk personeel van de fakulteit der geneeskunde, die voldoende mate getraind is voor deze onderwijsrol. Men zal daartoe de zgn. Tutortraining gevolgd dienen te hebben.⁵⁴⁰

The wording is very clear with regards to the fact that the staff member should come from the *scientific* department of the Faculty of Medicine – while it is not clear whether this included lab assistants, it ruled out students and secretaries. However, it appears that the rules were different for *skills trainers* – these were people not enmeshed in the PBL tutorial part of the education, but allocated instead to the guiding of *Skillslab* sessions (more will be said on this topic later). For these people, the following applied:

- A. De vaardigheidsdocenten hebben een hogere verpleegkundige opleiding, die binnen de fakulteit zal worden aangevuld om tot het vereiste nivo te komen, waarbij een specialisatie in de verschillende richtingen zal plaatsvinden.
- B. De vaardigheidsdocenten zijn ieder op zich gespecialiseerd in één bepaalde richting (b.v. fysiotherapeut, analist, psycholoog-assistent) en kunnen daardoor op hun gebied de overige docenten tot een bepaald nivo brengen.

Uitdrukkelijke voorwaarde voor deze beide mogelijkheden is dat de kandidaten hun technische opleiding hebben aangevuld in onderwijskundige richting, of ervaring hebben in het begeleiden van studenten.⁵⁴¹

In this instance, people from the paramedical professions, such as physiotherapists and nurses, could apply to join the Maastricht programme and guide students through their medical skills training. The historical evidence is not conclusive, but given the above-mentioned letter from 1979, which carries some weight given that it was written by the very group in charge of training tutors, it seems unlikely that indeed ‘anybody’ could be a tutor at Maastricht by the end of the 1970s. Was Maastricht then any different to McMaster with regards to its choice of tutors? Cees van der Vleuten recounts a discussion with Howard Barrows in which a key difference was indeed highlighted:

Let me tell you another story of Maastricht, which is different from McMaster. I think the Maastricht system was quite supported by the basic scientists. I still remember a visit from Howard Barrows where he all of a sudden realised it: ‘Holy smoke, this curriculum is run by the basic scientists!’ If you go to any

⁵⁴⁰ Translates as: The tutor role can, in principle, be fulfilled by any staff member coming from the scientific department of the faculty of medicine, whom is sufficiently trained for this educational role. One will have to have followed the so-called tutor training. In: Projektgroep tutorensysteem, ‘Letter to the chairman of the department of the faculty of medicine RL.’ Letter from 1979. Erasmus University, Private Collection of HG Schmidt. Rotterdam, the Netherlands.

⁵⁴¹ Translates as: A. The skills trainers have a higher nursing education, that within the faculty will be trained to reach the required level, where a specialisation in the different directions will take place.

B. The skills trainers are each specialised in their own direction (for instance physiotherapist, analyst, psychology assistant) and because of this are able to bring other teachers to a certain level in their field.

It is an express condition for both of these conditions that the candidates have added onto their technical study in the educational direction, or have experience in the guidance of students

In: Pie Bartholomeus, ‘Het Skillslab in de Komende Jaren’ [the Skillslab in coming years], OC 77-069 Memorandum from 1977. Rijksarchief in Limburg, 07.C06 - inventaris 94. Maastricht.

sort of medical school, trying to go to PBL in the world, you'll find the basic scientists opposed to it. They are usually resistant to going to PBL. Usually, it's the clinicians that like the whole idea of problem solving, of clinical skills... so they have easy buy-in. In Maastricht it was the exact opposite way. It was really the basic scientists who bought in, who had more time than the clinicians and ran the curriculum. And that was quite different from McMaster.⁵⁴²

The omnipresence of basic scientists at all levels of the programme – as tutors, as coordinators, as chairmen – was certainly visible both in the composition of the early employees of the MFM, and in their contributions to the educational debate. The psychiatric, psychological and psychosocial professions seemed heavily represented in this composition. For instance, the composition of the first Faculty board was made up of 50% clinicians and 50% basic scientists.⁵⁴³ What impact does the prominence of basic scientists as tutors and programme managers have on the development of PBL? Certainly, the PBL that emerged from a curriculum run with basic scientists could not be the clinical reasoning skills-driven PBL that Barrows imagined in his 1980 publication. The implications of this will be discussed further on in this treatise, when considering the historical debates on the core purpose of PBL.

Another distinguishing feature of the Maastricht tutors, which may be related to the fact that they were not clinicians, concerns their training. Indeed, McMaster was notorious for not providing any training at all to its tutors in the early years of its existence. The origins of tutor training at Maastricht are uncertain. Given that a memo from May 1977 indicates that tutor training commenced once year prior, we can assume that tutor training began in the summer of 1976.⁵⁴⁴ Biochemist Jan Rosing claims that when he arrived in 1976, he did not undergo any tutor training before being put to a group, which would make sense if he arrived in the first half of 1976.⁵⁴⁵ Henk Schmidt recalls that there may have been a preliminary form of training from 1975 already, a one-day affair run by Joost Bremer, possibly with the involvement of Norman Bell, but there is no other evidence to support this.⁵⁴⁶ The earliest description of tutor training can be found in a note by Henk Schmidt from June 1976 gives a broad list of suggestions for the forthcoming training:

De projectgroep heeft besloten dat de nieuw te ontwikkelen tutortraining opgezet zal moeten worden op een wijze die vergelijkbaar is met de sociale-vaardigheidstrainingen die in her Skillslab worden gegeven. Dat wil zeggen dat belangrijk onderdelen van de training geïndividualiseerd en docent-onafhankelijk zullen moeten zijn. De voordelen van een op deze wijze opgezette training zijn duidelijk: aspirant-tutores kunnen trainen op een moment dat het hen het beste uitkomt en er is geen voortdurend inzet van trainers noodzakelijk.⁵⁴⁷

According to this report, the training should consist of the following:

⁵⁴² van der Vleuten, in interview with the author, April 15, 2013

⁵⁴³ Kneegtmans, *Medische Faculteit Maastricht*, 236.

⁵⁴⁴ Schmidt, 'Voorstel tot het opstarten van een projekt "Tutor Systeem".'

⁵⁴⁵ Jan Rosing (*Second Chair of Biochemistry at MFM*), in interview with the author, at Maastricht University, April 17, 2013.

⁵⁴⁶ Henk Schmidt, *in correspondence with the author*, June 27, 2015.

⁵⁴⁷ Translates as: The project group has decided that the tutor training to be developed will be set up in a way that is comparable to the social skills training that is given in the skills lab. This means that important parts of the training will be individualised and matched to the specific tutor. The up side of a training set up in this way is clear: the aspiring tutors can train at moments that are best suited for them and there is no need for an on-going work on part of trainers. In: Schmidt, 'Rapportage van de projectgroep Tutortraining'.

1. The aspiring tutor would have to read a certain amount of materials connected to PBL, and the role of the tutor therein, which included a certain number of publications from international journals and a piece (not yet written at the time) that should contain 'guidelines for behaviour' for the adequate functioning of a tutor.
2. The aspiring tutor had to watch videotapes in which educational groups were working. They had to assess these mostly with regards to tutor behaviour, then compare their ideas with the standard assessment that they received afterwards.
3. The 3rd phase consisted of working with an audio-visual interaction machine that had been developed in the skills lab. The aspiring tutor received fragments of problematic group situations with the question: 'how would you react to this?'
4. In groups of 3 or 4, the tutors will compare their reaction to fragments of group situations.
5. A whole day was used for PBL group simulation in which 5 to 6 tutors took turns role-playing the various roles within the group.
6. Finally, the tutor had to tape-record his or her first meeting and have this replayed with an experienced tutor.

Unfortunately, this training programme was not very successful. A list of its failures was compiled by Schmidt only a year later:

De ervaringen met deze training zijn, de eerlijkheid gebiedt om dat te zeggen, niet altijd gunstig geweest. Dat is waarschijnlijk minder te wijten aan de opzet van de training zelf, dan aan een aantal structurele zaken, die het optimaal functioneren van de training binnen het onderwijs in de weg staan.

- Daar is in de eerste plaats het feit dat gemiddeld slechts zestig procent van de stafleden en studenten, die waren opgeroepen voor de training ook werkelijk komt opdagen. Daarbij is dan ook nog een groep die het doen van de training als een soort korvee beschouwt, en zuiver plichtmatig aanwezig is.
- In de tweede plaats is de training waarschijnlijk wat te algemeen om een echte goede voorbereiding te zijn op het tutorschap in specifiek blokken
- In derde plaats is de organisatie van de training te zeer ad hoc. Er is geen duidelijk structuur waarbinnen bijvoorbeeld de inzet van mankracht verantwoord kan worden. Zo draagt het verzoek van de coördinator aan een capaciteitsgroep om trainers te leveren meestal het karakter van een smeekbede, omdat de bijdrage die die trainers leveren aan het project nergens als onderwijsinzet geadministreerd lijkt te worden.⁵⁴⁸

Thus, in 1977, Schmidt was made responsible the renewal of the project 'Tutor Training', the name of which was changed to: *Projekt Tutorensysteem*. The new system was no longer based on psychoanalysis or group dynamics, but instead, focused on behaviour analytics. *Het*

⁵⁴⁸ Translates as: The experiences with this training, we have to honestly say, have not always been positive. This is probably not the fault of the setup of the training itself but more because of structural issues that limit the optimal functioning of the training within the education.

- In the first place, there is the fact that on average, only 60% of staff and students that have been called to the training actually showed up. Besides that, there is also the group that sees these kinds of training as some sort of labour, which they only attend because they are mandatory.
- In second place, this training is probably a little too general to be a really good preparation on the tutorship in specific blocks.
- In third place, the organisation of the training is too ad hoc. There is no clear structure that can justify the use of manpower. Therefore the request of the coordinator to the capacity groups to deliver trainers is almost like begging, because the input that the trainers give to the project seems to not be administered as educational input.

In: Henk G. Schmidt, 'Voorstel tot het opstarten van een projekt "Tutor Systeem"'. OC 77-164. Proposal from 1977. Rijksarchief in Limburg, 07.C06 - inventaris 95. Maastricht.

Tutorensysteem came with its own handbook for tutors, and it is clear from this booklet that the core of the training was now to learn what sort of student behaviours a tutor might expect in a PBL group and how to respond to them. In a self-evaluation exercise at the end of the booklet, trainee tutors were asked to codify student behaviours into given categories, based on the transcript of a PBL meeting. They were also asked to reflect on a number of statements, such as ‘silent students have a negative impact on a group, yes or no?’⁵⁴⁹ Some general notes on tutoring and problem-based education were also provided, and if one looks carefully, one will see that *Het Tutorensysteem* was the foundation of the later publication *Onderwijs in taakgerichte groepen*,⁵⁵⁰ through which PBL was popularized in the Netherlands.

By 1978, it seems that the Tutor System was well in place, proposing to expand its activities to include the training of tutor supervisors as well as the tutors and students.⁵⁵¹ In fact, it seems that much of the later debates of the Project Group Tutor System concerned the relevance of content expertise to the tutor role rather than the structure of tutor training. In 1979, Jos Moust took over from Schmidt, as coordinator of the training for tutors and students.

An experiment in medical skills training

The training of medical skills was assumed to flow naturally from the problems at McMaster – no special provision was made to teach them separately or specifically when the programme was instigated in 1969. In practice, Barrows’ simulated patients went some way to providing skills training, but it seemed that most of the training was done in the clinical years. There was no mention of specific skills training in the eight forms on education listed in a Programme Guidelines of 1970.⁵⁵² An undated document (probably written in 1977) claims that in 1972, the issue of teaching skills as a separate discipline first emerged at McMaster, and in 1975, a Skills Coordinator was appointed.⁵⁵³ However, the first plans to start developing a specific “skills programme” only appeared in 1977, when Ron McAuley stated:

Clinical Skills has recently been reviewed by the Programme Executive Group. A working agreement has been reached with Phase III planners that Clinical Skills should be viewed as any other discipline in the Programme.⁵⁵⁴

From there on, a McMaster began developing a medical skills programme that ranged through the three pre-clinical phases of the programme. However, it seems that in this area, they were superseded by Maastricht by quite some margin!

⁵⁴⁹ Schmidt, ‘Het Tutorensysteem (2e Druk)’.

⁵⁵⁰ Schmidt and Bouhuijs, *Onderwijs in taakgerichte groepen*.

⁵⁵¹ Henk G. Schmidt, ‘Letter to the members of the Onderwijscommissie and the portefeuillehouder Onderwijs in the Faculty Board.’ OC 78-080. Letter from 1978. Rijksarchief in Limburg, 07.C06 - Inventaris 96. Maastricht

⁵⁵² Unknown, ‘Phase I: 1970, Guidelines to Operating the Programme.’ Memorandum from 1970. Educational Programme Committee - 1970 - HHS / FHS Archives, Box 232.5;8. McMaster University, Hamilton, Ontario

⁵⁵³ Unknown, ‘Clinical Skills (n.d.).’ Report from 1977. Educational Programme Committee - 1977/1978 - HHS / FHS Archives, Box 233.2;3. McMaster University, Hamilton, Ontario.

⁵⁵⁴ Ron McAuley, ‘MD Education Programme - Current Status and Proposed Plans for Areas Requiring Attention in the Coming Year. - September 12, 1977’, Report from 1977. Educational Programme Committee - 1977/1978 - HHS/ FHS Archives, Box 233.2;3. McMaster University, Hamilton, Ontario.



Figure 3: Two medical students practicing in the Skillslab (photo courtesy of Pie Bartholomeus)

Little mention was made of the Maastricht *Skillslab* before 1976, although Knegtmans claims that founding board members Brouwer and Wijnen had planned for it as early as 1973.⁵⁵⁵ We know that it existed from the very first year of the MFM because of a report written by Willighagen & Schmidt in 1975 requesting that some elements of skills training that were originally integrated in the thematic blocks be moved to the *Skillslab* and given eight hours a week in the programme.⁵⁵⁶ According to Pie Bartholomeus, who coordinated the *Skillslab* for many years, the idea came from Evert Reerink, who had visited several institutions in North America for inspiration, including a nursing faculty in East Lansing.⁵⁵⁷ The *Skillslab* was also inspired by Barrows and his integration of clinical practice in the problem-solving process with simulated patients. But Reerink's plan went one step further by consolidating all of these medical skills practices into one laboratory area:

Howard Barrows and his staff were helping us in getting over that [clinical skills] line, so it's perfectly able to not only have simulated patients who act really as patients in physical pain, and have physical problems, but also that your students can act as patients and helping your colleague student in understanding abdominal pain or problems with walking, you name it. And that was another factor that led to the idea that you could in an organizational way put all these things together in the 10-15 domains in medicine like surgery, medicine, paediatrics and then build a structure around it, isolate it, develop it, organize it in such a way that it is accessible to students 24/7, another wild idea we had! And you can build evaluation systems, self-evaluation systems, all based on what the, especially what the anaesthesiology mannequins had taught us. So there came the basic idea of a Skills lab. It was in this form not new. I think when you read the development in McMaster of course; it was there already implemented. But when we visited that outfit, it was rather disappointing because, well, a set of rooms, and a number of mannequins

⁵⁵⁵ Knegtmans, *Medische Faculteit Maastricht*, 121.

⁵⁵⁶ Willighagen, and Schmidt, 'Voorstel tot opbouw van een geïntegreerd 1e studiejaar'.

⁵⁵⁷ Pie Bartholomeus, (*Skillslab coordinator 1975-1990*) in interview with the author, at Erasmus University College, October 12, 2015.

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and instruments were put behind glass and it did not look at all at a laboratory. It was a lecture hall, lecture room idea with examples. And what we had in our education system for centuries, that's where the pathologist had his laboratory, so called laboratory or his exhibition of weird things in bottles to the... for students to learn and, but that was a disappointment. And then of course we had the additional task to outdo McMaster and put it in a... well a separate laboratory type of thing and that is of course rather difficult in a brand new university that had no buildings at all and had to take refuge in a monastery for these educational activities! And... but experimenting and young, enthusiastic staff did quite a lot in getting this off the ground.⁵⁵⁸

It seems that the *Skillslab* was organized in a tentative manner in the first few years of its existence, under the coordination of Leon Lodewick and with the help of Henk Schmidt and Rutger Lulofs (a medical psychologist), and Eugene Heerens (a physiotherapist).⁵⁵⁹ This tentative nature of the skills programme prompted students to request more structure, qualified trainers, theoretical background knowledge, and more hands-on practicals in the evaluation of the year 1976-77.⁵⁶⁰ In response, the MFM appointed a coordinator in the person Pie Bartholomeus to get the *Skillslab* on track:

De tijd lijkt rijp om de periode van 'improvisatie', waarin de wals van het onderwijs over het Skillslab heen denderde, af te sluiten en een nieuwe stadium in te luiden. De afgelopen periode werd nogal gekenmerkt door een sfeer van "laten we er maar van maken wat ervan te maken valt", een sfeer die niet alleen veroorzaakt werd door een chronische tijdnoed, maar ook door onduidelijkheden, irreële verwachtingen, gebrek aan ruimte, materiaal, mankracht, etc. In deze korte periode is met zeer weinig mankracht en weinig middelen een heleboel tot stand gebracht. Anderhalf jaar actieve vaardigheidstrainingen hebben de gedachtevorming over realisering en vormgeving van de Skillslab doelstellingen versneld.⁵⁶¹

As part of this effort, the *Skillslab* was re-shaped into a new co-curricular programme to start in September 1977 and last through the six years of the medical study. The new version of the *Skillslab* was a place where students could go, with or without the supervision of a trainer, to practice the clinical skills relevant to a block on mannequins and other available simulation tools throughout their six-year education at Maastricht. As part of the *Skillslab* revamp plan, the students were confronted with five levels of skills mastery:

1. Having knowledge of the procedure of a certain skill: this was a required basic level for all skills. In this instance, the student was expected to know of the procedure and its potential uses and effects on the patient, without necessarily being able to perform it himself.

⁵⁵⁸ Reerink, in interview with the author, May 31, 2013

⁵⁵⁹ Knegtmans, *Medische Faculteit Maastricht*, 121.

⁵⁶⁰ 'Resultaten van de Programma Evaluatie van het Studiejaar 1976-1977' [Results of the programme evaluation of the study year 1976-1977] OC 77-289. Report from 1977. Rijksarchief in Limburg, 07.C06 - inventaris 95. Maastricht.

⁵⁶¹ Translates as: The time seems right to end the era of improvisation where the steamroller of education flattened the Skillslab and turn a new page. The past period has been characterised by an atmosphere of "let's make what we can of it". An atmosphere that was not only caused by a chronic lack of time, surreal expectations, lack of space, material, manpower etc. In this short period, a lot has been achieved with very little manpower and means. A year and a half of active skills training have quickened the shaping of thoughts about realising and shaping the Skillslab goals. In: Bartholomeus, 'Het Skillslab in de Komende Jaren.'

2. Having seen how a procedure is done. In this case, while he may not have performed it himself, the future doctor would have witness the skill in question being applied by senior colleagues.
3. Having practiced a certain skill multiple times himself.
4. Total ownership of a skill. The idea behind this was that every basic doctor should have to master a certain number of skills at this level, which would be required for his direction of specialization.
5. The integration of a skill in the entire diagnostic and therapeutic process. This last level of mastery would only be expected of 5th and 6th year students.⁵⁶²

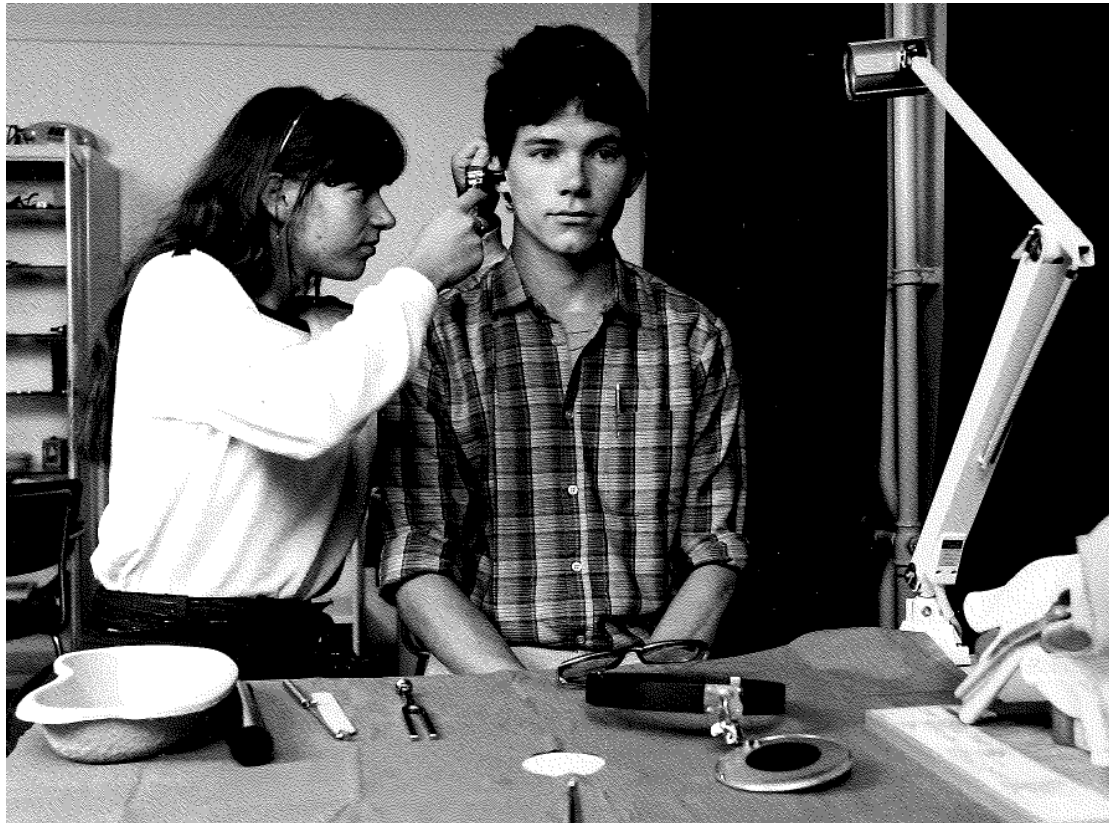


Figure 4 Two medical students practicing in the Skillslab (photo courtesy of Pie Bartholomeus)

Even though the *Skillslab* existed as a course in its own right, Bartholomeus was keen to emphasize that the skills should ideally be integrated with the rest of concurrent block. According to Schmidt, this was merely a continuation of a policy of integration which had been present from the start:

It was the intention from the beginning to organize the *Skillslab* programme as closely as possible to the actual curriculum. And the example that I gave you already was the example of the block ‘traumata’ – block 1.2. Where the students were trained in first aid skills and then had an exercise in applying them on real shouting and bleeding patients in the garden of the monastery.⁵⁶³

This integration was not always practical or feasible, but it remained a strong ideal that has pervaded in medical PBL to this day. In fact, the *Skillslab* proved so popular an idea that PBL-practicing faculties and even traditional schools of medicine across many parts of the world,

⁵⁶² Bartholomeus, ‘Het Skillslab in de Komende Jaren’, 3.

⁵⁶³ Schmidt, in interview with the author, 25th April 2013.

and in particular Indonesia, can be seen to use the typically Dutch contraction of two English words to describe this practice – a testimony to the lasting influence of this Limburgian invention!

A breakthrough in assessing PBL

As we saw in the previous section of our treatise, summative assessment was anathema to the early McMaster philosophy. Indeed, in its first few years of existence, there were no examinations to speak of, and only formative evaluation provided by the tutor and other self-evaluation mechanisms such as Barrows' Problem Boxes were available to help students estimate their level. But, as Cees van der Vleuten pointed out: 'McMaster didn't have anything. They didn't need to do it either, because they had their national exam.'⁵⁶⁴ Indeed, the LMCC provided, as we have seen previously, the external benchmark by which students could show the world that their levels of knowledge and competence were equal to all other medical students in Canada. Unfortunately for Maastricht, it was deprived of such a national validation tool. Fortunately, it had Wynand Wijnen, assisted by Maarten Verwijnen, a physician-cum-educator, Tjaart Imbos, a psychometrician, and, at a later stage, Cees van der Vleuten. Wijnen who endowed Maastricht with arguably the most creative and enduring innovation in medical assessment in the Netherlands over the past 50 years, the 'Progress Test' – so enduring indeed that it now serves as a quasi-national medical examination in the country, even among non-PBL medical faculties!⁵⁶⁵ The concept behind this unusual exam is list of 250 multiple-choice questions drawn from a bank covering the entirety of the medical programme, which is to be administered four times a year to all medical students irrespective of their year of study. The idea is that students will score poorly in their first year but progressively build their way up to a good score, whilst avoiding exam-oriented studying behaviour.⁵⁶⁶ In this section we will track down the origins of this invention.

As we have seen, Wynand Wijnen had already begun musing on the question of assessment during his time at Groningen University, and brought these reflections to the table when he was invited to consult on the Maastricht project. The idea of *voortgangsevaluatie* (progress testing) was included as one of the four pillars of education in *Basisfilosofie* of 1972, although without defining what this meant in practice, other than attaching the label 'formative evaluation' to it.⁵⁶⁷ Did this broad policy statement already foreshadow the famous medical test? This is unlikely – it is more likely that Wijnen simply meant 'the evaluation of student progress'. This is indicated by a critical memorandum written by Wijnen himself in 1975 in which he reflects on the first year of the MFM and states:

⁵⁶⁴ Van der Vleuten, in interview with the author, at Maastricht University, April 15, 2013.

⁵⁶⁵ See for instance: Arno MM Muijtjens et al. 'Benchmarking by cross-institutional comparison of student achievement in a progress test.' *Medical Education* 42, no. 1 (2007): 82–88. doi:10.1111/j.1365-2923.2007.02896.x

⁵⁶⁶ For a fuller description see: Cees van der Vleuten, G Maarten Verwijnen, and Wynand Wijnen, 'Fifteen years of experience with progress testing in a problem-based learning curriculum.' *Medical Teacher* 19, no. 2 (1996): 103-109.

⁵⁶⁷ 'Basisfilosofie'

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Hoewel er naar aanleiding van een van de taken binnen de onderwijsgroepen aandacht werd besteed aan voortgangsevaluatie, was binnen de onderwijseenheid te weinig vorm gegeven aan dit principe. Van tussentijdse toetsingen was eigenlijk helemaal geen sprake, of hoogstens in de zin van praten over het programma. Ook het teruggeven van informatie over de kwaliteit van de uitgevoerde taken werd ten onrechte nagelaten. Dit laatste punt roept een reëel probleem op, waarvan de oplossing niet eenvoudig lijkt. De tijd, dit beschikbaar is om kanttekeningen te maken bij ingeleverde verslagen is bijzonder kort, terwijl in enkele gevallen het inleveren van de verslagen werd uitgesteld tot aan het einde van onderwijseenheid. Zeker is wel, dat er geen informatie aan de onderwijsgroepen werd teruggegeven en het lijkt zinvol na te gaan op welke wijze bij een volgende ronde kan worden uitgevoerd.⁵⁶⁸

As we can see from this citation, Wijnen was referring to assessment within the units themselves. Indeed, during the first two years of the Faculty, evaluation comprised solely of end-of-block, multiple-choice exams and there was no mention of a cross-unit test. So how and when did the idea of the *voortgangstoets* as we know it now come about? Former Maastricht education researcher Erik de Graaff had a clear explanation:

The explanation is quite straightforward. They started out with thematic blocks. At the end of each thematic block, there was a block test, and the students were expected to define their own learning goals during working on the block. When the result was to be determined by the block test, several students tried to figure out what they needed to do to get a pass grade on the block test. So rather than defining their own learning goals with all freedom, they were trying to figure out: "What is the minimum we need to know to get a passing grade". And then they decided, and I think Wynand had a crucial role in that: "Then you need to take away the decision part from the block test. You need to take the summative aspect of the evaluation away from the block test, use it only for formative purposes and create some other tool to make decisions on student progress". So that's why they invented the progress test.⁵⁶⁹

The exam-oriented behaviour of the students was so obviously contrary to the ideas of PBL that Wijnen wrote in early 1976 a memorandum in which he stated: 'self-directed learning with a certain freedom of choice for the education groups and the same for individual students doesn't seem to be compatible with the testing system for exams when a planning group makes the demands.'⁵⁷⁰ As a solution, Wijnen proposed dividing assessment at Maastricht into two categories: formative and summative. The former should be specific, qualitative, intermediary, non-binding and connected to the educational activities with which the student was presently engaged. The latter should be more general, quantitative, concerned with the end goal of the study rather than the specific educational activities of the moment. Wijnen rejected the idea that, like at McMaster, one final summative exam would suffice to qualify or disqualify the future doctor. One must remember that McMaster was only a three-year programme, whereas a failed doctor at Maastricht would have wasted six years of study and taxpayer's money! And

⁵⁶⁸ Translates as: Although we paid attention to progress evaluation as a result of one of the tasks within the education groups, this principle was lacking within the education unit. There were no intermediary evaluation - maybe in the sense of talking about the programme. No feedback about completed tasks was given - this last point is a real problem, to which the solution doesn't seem simple. The time that is available to make side-notes for the reports that are handed in seems especially short while in some of the cases handing in reports was postponed until the end of the education unit. It is certain that no information was given back to the education groups and it seems useful to look into how this can be done in the next round. In: Wynand Wijnen, 'Onderwijseenheid I: Inleiding tot de Medische Studie. Verslag van de Koordinator' [Teaching Unit I: Introduction to Medical Study. Report of the Coordinator] OC 75-055. Report from 1975. Rijksarchief in Limburg, 07.C06 - inventaris 90. Maastricht.

⁵⁶⁹ De Graaff, in interview with the author, at Aalborg University, 9th January 2013.

⁵⁷⁰ Wynand Wijnen, 'Evaluatie van Studieresultaten' [Evaluation of study results], OC 76-059. Report from 1976. Rijksarchief in Limburg, 07.C06 - inventaris 90. Maastricht.

so it was that in one small paragraph, almost as a side note after pages of reflections on the purpose of evaluation, Wijnen proposed the ‘Screening Test’: a series of ‘tests consisting of multiple choice questions (4x per year yes / no questions). One could think of taking these screening tests as sample questions from a pool that represents the knowledge base of a GP.’⁵⁷¹ There it was, lost between musings on attitude development and evaluating future doctors’ speech-giving abilities.

The concept was further developed in a subsequent memorandum written by Wijnen entitled *Konkretisering Evaluatievoorstel* (concretization of the evaluation proposal).⁵⁷² In this proposal, he suggested a commission of five people to establish the ‘Screening Test’, and a separate commission of five people to look at formative evaluation concomitantly. The proposal suggested that the progress test be administered six times a year, and attempt to assess, in particular, problem-solving skills, attitudes and other skills from the domain of the skills lab, and the necessary medical knowledge.

However, it seems that while the Progress Test succeeded in achieving this last goal, the other two were somewhat lacking. An undated memorandum by Wijnen and Schmidt offers a reflection on the subject of the difficulties encountered by Wijnen’s invention:

It turned out to be almost impossible to evaluate student progress on a test that is the same for every student, if you want students to formulate and reach individual objectives. Their progress in different fields is now measured by other means, which are independent of the context of the contents of a specific educational unit. Because the staff are only indirectly involved in this evaluation system, (they provide the questions, the decisions about student achievement are made by a committee), not everybody recognizes the value of this approach. It has to be taken into account that at this moment only in the field of medical knowledge student progress is measured: skills, attitudes and the ability to solve medical problems are not measured yet. This seems somewhat paradoxical, considering the educational objectives the institution has set.⁵⁷³

Indeed, the results of the study evaluation of 1976-77, after the first year of the ‘Screening Tests’, are telling in this regard: the majority of students thought that the test did not cover problem-solving skills and attitude-development enough on the one hand, and that formative evaluations did not give an adequate overview of the students’ input during a block on the other.⁵⁷⁴ It seems that this problem was never really tackled, and by 1977, the Screening Test essentially had the format that we know now, with Yes/No questions and a ‘paper problem’ at the end.

⁵⁷¹ Wijnen, ‘Evaluatie van Studieresultaten.’

⁵⁷² Wynand Wijnen, ‘Konkretisering Evaluatievoorstel’ [Concretising the Education Proposal], OC 76-100 Memorandum from 1976. Rijksarchief in Limburg, 07.C06 - inventaris 90. Maastricht.

⁵⁷³ Wynand Wijnen, and Henk Schmidt, ‘Problem-based learning at the Medical Faculty in Maastricht, the Netherlands.’ Undated report. Erasmus University, Private Collection of HG Schmidt. Rotterdam, The Netherlands.

⁵⁷⁴ ‘Resultaten van de Programma Evaluatie’

SCREENINGSTOETS d.d. 11 Maart 1977

1. Corynebacterium pseudodiphtheria komt normaal als commensaal in de keelholte voor.
2. Grampositieve bacteriën zijn gevoeliger voor (benzyl) penicilline dan gramnegatieve bacteriën.

Tot welke van onderstaande ziektebeelden kan Staphylococcus aureus aanleiding geven?

- a. wondinfectie
 - b. osteomyelitis
 - c. pneumonie
 - d. enteritis
 - e. furunkel
3. “Pelvic congestion” is een syndroom, waarbij menorrhagieën, dysmenorrhoe buikpijn en rugpijn de belangrijkste symptomen zijn.

Spontaan abortus wordt gekenmerkt door:

- a. vaginaal bloedverlies
- b. ophouden van zwangerschapsbraken

Etc...

Figure 5: Extract from a Screening Test of March 1977⁵⁷⁵

Setting the foundations of PBL research

When McMaster began its PBL curriculum, it concerned itself principally with defining the parameters under which this new problem-based model of education would operate and not so much on *why* or *how* said model might be more effective. As we have seen, the early Education Committee of McMaster produced a few scattered publications, all of which were descriptive or conceptual and strictly none of which were empirical in nature: Spaulding and his Committee were not particularly interested in empirical educational research. In fact, the first empirical studies to come out of McMaster were done in the late 1970s by the Programme for Education Development and Research under the leadership of Vic Neufeld.

⁵⁷⁵ Translates as: Screening Test of 11 March 1977

1. corynebacterium psudodiphtheriae is normally found in the pharynx
2. Gram-positive bacteria are more sensitive to (benzyl) penicillin than gram-negative bacteria.
To which of the following diseases can staphylococcus lead?
 - a. Wound infection
 - b. Osteomyelitis
 - c. Pneumonia
 - d. Enteritis
 - e. Furuncle
3. “Pelvic Congestion” is a syndrome of which menorrhagia, dysmenorrhea, stomach pain and back pain are the most important symptoms.
Spontaneous abortion in characterised by:
 - a. Vaginal blood loss
 - b. The cessation of morning sickness

I understand that the numbering may confuse the reader in this case but this is the exact format used in the progress test. One can only imagine the confusion of the students. In: ‘Screeningstoets d.d. 11 Maart 1977’ [Progress Test from March 11, 1977], OC 77-062. Examination from 1977. Rijksarchief in Limburg, 07.C06 - inventaris 94. Maastricht.

The importance of educational research at Maastricht was embedded in the programme from the very start, given Wynand Wijnen's background as an educational researcher. The *basisfilosofie* called for a 'build-up of the curriculum in close connection with the educational experts'⁵⁷⁶ – something that McMaster never did - and from its inception, the MFM possessed a department specifically dedicated to *Onderwijs en Onderzoek* (Education and Research). Curiously, Wijnen himself did very little in terms of empirical research, and there is no evidence that he ever published anything significant in this regard. However, his young employees Peter Bouhuijs and Henk Schmidt took on a very prominent role in that regard as early as 1977.

The pair conducted their first dual study on the subject of 'The Effect of Task Division on an Educational Group'⁵⁷⁷ and 'The Effect of the Structuring of Patient Problems on the Study Results and Learning Satisfaction of Students'.⁵⁷⁸ The former looked at whether learning goals within a problem were best divided among student group members or done by all group members simultaneously during the self-study period of PBL. The latter assessed whether students would perform better and find their learning to be more satisfying if they were handed a problem with structuring questions to assist their self-study. Neither study showed a statistically significant difference in learning outcomes measured by a knowledge retention test, but both studies suggested some differences in study satisfaction – in the former, students were more satisfied when they could tackle the problem's learning objectives in their entirety, and in the latter, when they were encouraged to explore a broader range of topics than merely sticking to the structuring questions. The research was published internally in a report format, and it seems that it was not entirely well received by some of those amongst whom it was circulated. Indeed, in April 1977, Frans Verstappen, a physiologist working at the MFM, issued a virulent critique of Bouhuijs and Schmidt's work, calling it 'tendentious' and scientifically unacceptable. After mercilessly tearing apart the statistical significance and methodological omissions of the studies, Verstappen concluded dramatically:

I believe that the publication of this critique in *Maffius* will do the educational system of Maastricht more harm than good. This is why I chose this means of communicating instead. If you would like to react to this, I am open to further discussion.⁵⁷⁹

These early criticisms did not deter the young researchers, and that same year, Schmidt outlined a proposal for a comprehensive education research programme, which he reasoned as follows:

Het voorstel om een hoofdprojekt onderzoek van onderwijs tot stand te brengen berust op de volgende overwegingen:

⁵⁷⁶ 'Basisfilosofie'

⁵⁷⁷ Peter Bouhuijs and Henk G. Schmidt, 'Effekten van taakverdeling binnen onderwijsgroepen op leerresultaat en satisfaktie bij studenten' [Effect of task division on study results in an education group and student satisfaction], Research report from 1977. Erasmus University, Private Collection of H.G. Schmidt. Rotterdam.

⁵⁷⁸ Henk G. Schmidt and Peter Bouhuijs, 'Effekten van structurering van patientenproblemen op leerresultaat en satisfaktie bij studenten' [Effects of structuring patient problems on study results and student satisfaction], Research report from 1977. Erasmus University, Private Collection of H.G. Schmidt. Rotterdam.

⁵⁷⁹ Frans Verstappen, 'Letter to H. Schmidt & P. Bouhuijs - 18 April 1977.' Letter from 1977. Erasmus University, Private Collection of HG Schmidt. Rotterdam, the Netherlands. Note: *Maffius* was the medical journal of the MFM.

CHAPTER 3: THE MAASTRICHT EDUCATIONAL CHALLENGE

- Bij voorbereiding en uitvoering van het onderwijsprogramma rijzen tal van vragen, die alleen in het kader van zorgvuldig onderzoek beantwoord kunnen worden.
- De betekenis van de onderwijskundige opzet in Maastricht voor opleidingen elders moet worden versterkt door uitgangspunten en concrete uitwerkingen onderzoek-matig te onderhouden. ...
- Het ontbreken van carrière-lijnen op basis van onderwijs-inspanningen maken het voorsnog noodzakelijk, dat publikaties mogelijk worden gemaakt in de sfeer van onderzoek van onderwijs.
- De problematiek van het hoger onderwijs in het algemeen en de problematiek van het medische onderwijs in het bijzonder – met name de spanning tussen vraag en aanbod, maken onderzoeksactiviteiten in deze sector alleszins noodzakelijk.⁵⁸⁰

This research proposal centred on the four educational pillars of the *basisfilosofie*, namely – problem-orientation, self-directedness, progress-evaluation and attitude development. Under each, Schmidt offered lead questions for future research. It is clear from this memorandum that problem-orientation and self-direction were his preferred direction of research.

Schmidt and Bouhuijs went on to publish the highly successful book *Onderwijs in Taakgerichte Groepen* in 1980. While this was not strictly speaking an empirical piece of work, it did reflect a willingness to move beyond the sort of merely descriptive and specifically programme-bound reflections offered by Barrows and Neufeld⁵⁸¹ or Hamilton⁵⁸² at McMaster. Indeed, while the book contained some references to Maastricht, it was intended as a sort of educational manual usable by all.

In 1982, Schmidt received his doctoral degree on the basis of conceptual and empirical studies on the role of the activation of prior knowledge in furthering knowledge retention in a problem-based environment⁵⁸³ – a line of enquiry which propelled him into the field of cognitive-psychology research and made him the most published author in problem-based learning research at the time of writing.⁵⁸⁴ It is fair to say that the department of *Onderwijsontwikkeling & Onderzoek* of the Faculty of Medicine of Maastricht University has been the single most prolific producer of empirical research on PBL in the method's 50 year history. Of the ten most published authors in the field at the time of writing, six were from Maastricht.⁵⁸⁵ When asked about the progression of research since the two studies by Schmidt and Bouhuijs, Cees van der

⁵⁸⁰ Translates as: The proposal to set up a key project “Research in Education” comes from the following considerations:

- In the preparation and implementation of the education programme, there are a number of questions that can only be answered in the framework of thorough research.
- The meaning of the educational setup in Maastricht, for studies elsewhere, has to be strengthened by building assumptions and concrete implementation. (...)
- The lack of career paths on the basis of educational commitment means that it is for now necessary that publications are made possible in the framework of research in education.
- The problem of higher education in general and medical education specifically make research activities in this sector quite necessary. These problems are the tension between supply and demand

In: Henk G. Schmidt, ‘Hoofdprojekt onderzoek van onderwijs’ [Main project research on education], OC 77-249. Memorandum from 1977. Rijksarchief in Limburg, 07.C06 - inventaris 95. Maastricht.

⁵⁸¹ Neufeld and Barrows, ‘The “McMaster Philosophy”’.

⁵⁸² John D. Hamilton, ‘The McMaster Curriculum: A Critique.’ *The British Medical Journal*, 1, no. 6019 (1976): 1–7.

⁵⁸³ Henk G. Schmidt, *Activatie van voorkennis, intrinsieke motivatie en de verwerking van tekst*. (Apeldoorn: Van Walraven, 1982).

⁵⁸⁴ Luis A. Pinho et al., ‘Mapping Knowledge Produced on Problem-Based Learning between 1945 and 2014: A Bibliometric Analysis.’ *Creative Education* 6 (2015): 576-584.

⁵⁸⁵ Pinho, ‘Mapping Knowledge’, 580.

REVOLUTIONS & RE-ITERATIONS

Vleuten, the second most published author in the field of PBL research, stated: ‘I think we have ever since been tinkering with [PBL]. And then the research informed many of the things that we did’.⁵⁸⁶

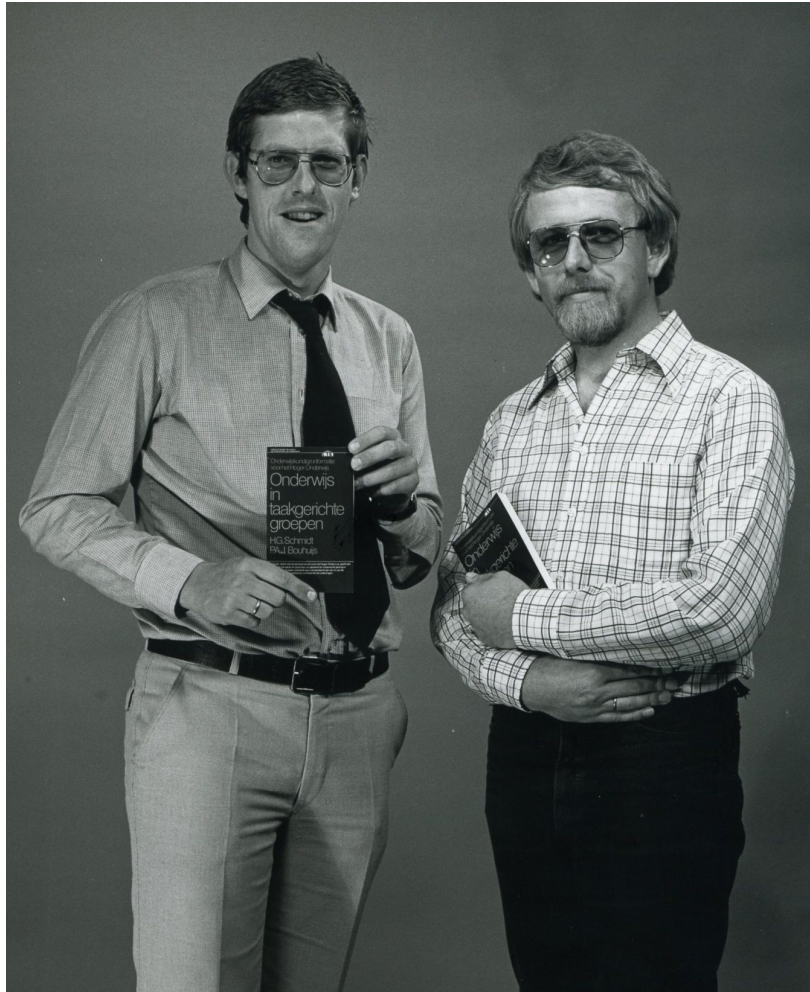


Figure 6: Henk Schmidt and Peter Bouhuijs promoting ‘Onderwijs in Taakgerichte Groepen’ in 1980

⁵⁸⁶ van der Vleuten, in interview with the author, 15th April 2013.

Underpinnings of the Basic Philosophy (1972)

Whereas McMaster's founding principles were written on an A4 typewritten sheet by Dean Evans, Maastricht had the luxury of a full article with the promising title 'Basic Philosophy', appearing in the Dutch medical journal *Medisch Contact*.⁵⁸⁷ One might be forgiven for deducing from this historical difference that Maastricht's Faculty of Medicine was bolstered by strong intellectual foundations, set in stone (or in publication) in a founding charter of sorts. Educational philosophers will then be rather disappointed to learn that there was nothing philosophical about the *Basisfilosofie* of 1972. Of the eight-page document, only a small subsection is devoted to pedagogy, and the writings therein are somewhat obscure.

Certainly, the term 'problem orientation' featured in the text, but this had little to do with problem-based learning and was instead linked to the organization of learning around important health matters. According to Schmidt, this must have come from Dean Tiddens whose principal focus was primary health care, inspired by his work on the subject at the World Health Organization. The statement about problem-orientation may have been tied with the latter's will to do away with an academic hospital. Tiddens already knew Evans in 1972, but the *Basisfilosofie* hardly reflects the objectives that were laid out by Evans in 1966 and later expanded upon by Spaulding. After this broad statement, the pedagogical creed of the *Basisfilosofie* falls into disarray. In terms of a philosophical stance on education, the terminology of the document makes little sense, offering a generous mix of humanist cum existentialist 'self-directed learning' and 'attitude-development' and Skinnerian 'teaching machines' without any explanation or justification, or even the realization that these ideas come from diametrically opposed views of learning. It is as if somebody picked out the trendiest educational jargon of the decade and threw it into the hodgepodge text. As we have seen, although 'progress evaluation' featured in the *Basisfilosofie*, in no way did this reflect what eventually became Wynand Wijnen's 'Progress Test'. Given these statements, the reader might feel somewhat cheated by the title of this section that promised to unravel the underpinnings of the basic philosophy of Maastricht Medical Faculty. All is not lost; some important points mentioned in the text were indeed implemented, such as the call of an important role given to be given to educational experts and an emphasis on teachers being trained in educational processes. This culminated in the involvement of Wijnen, Schmidt, Bouhuijs, etc. in education research and teacher training.

In summary though, it is fair to say that the *Basisfilosofie* at best built the very wide frame within which the educationists at Maastricht could develop their ideas, but they would have to bring those ideas in themselves – the committee that drafted the founding document certainly did not claim any intellectual affiliations. This opened the door wide for perhaps the most

⁵⁸⁷ 'Basisfilosofie', 879-84.

important and lengthy intellectual debate in the forty-year history of PBL: the dispute between the information-processing and the constructivist interpretations of PBL.

Two paradigms for understanding problem-solving

The people at McMaster University held a wide range of beliefs about education – varying from Spaulding’s idiosyncratic interest in Comenius to the more widely held attachments to Flexner and Rogers. This evidently also included those who had no specific beliefs about education whatsoever. What they did not have, however, was an understanding of the science of learning. This latter interest was brought to Maastricht by Wijnen and his team of psychologists, including Schmidt and Bouhuijs, and later on Cees van der Vleuten, who took charge of the Department of Educational Research and Development in the 1990s. The question then became: what actually happens to the learner who is engaged in problem-based learning? On the one hand, some believed that problem-based learning was about developing a set of ‘clinical reasoning skills’ that could be transferred to all problems. An important element of these skills was a process called ‘hypothetico-deduction’. On the other hand, others believed that learning with problems was indeed content-specific, and the purpose of problems could not be to elicit the simulation of professional practice, but instead the deep understanding of underlying principles. In this chapter we will expose the tenets of both theories and then explain the waning and waxing (or vice versa) of the popularity of both in the field of psychology at large, and at Maastricht University more specifically.

Before the 1950s, there existed only two credible paradigms through which problem-solving could be understood: the *Gestalt* School and radical behaviourism. *Gestalt* psychology that was founded by Max Wertheimer just prior to the Great War, and concerned itself with the mind’s handling of concepts. In brief, the core belief of *Gestaltists* was that the brain handles information in simple, symmetrical and organized structures. This leads to a continuous and regular transposition of perceptual ‘units’, or *gestalts* from one problem situation to the next. Thus, according to this understanding of mental functioning, learning is simply a process of trial-and-error which only comes to a halt when a moment of insight, known as a ‘*gestalt* switch’ provides the solution to a problem – the resolution is seen as sudden and complete.⁵⁸⁸ Radical behaviourism represented the logical progression of the works of Ivan Pavlov and Edward Thorndike. Born in the 1910s as the brainchild of the American psychologists John Watson and later advocated by Burrhus Skinner, the theory posited that internal mental events had no significance in the study of learning. The basic tenet of the behaviourist approach to problem solving was as follows: all animals (including humans) solve problems by using a solution X because this solution has previously worked when problem Y has arisen (positive reinforcement), and the initial discovery of solution X must have happened by chance in a

⁵⁸⁸ This brief overview of Gestalt psychology is summarized from Baldwin R. Hergenhahn, *An introduction to the history of psychology* 4th ed. (Belmont, CA: Wadsworth Pub. Co., 2001).

process of trial and error – one can think here of Thorndike’s cats that were left in a box until, desperate to escape, they chanced upon a lever that cause the door of the box to open.⁵⁸⁹

Then, in 1956, an alternative psychological approach rather suddenly appeared on the academic stage: cognitive psychology. According to American psychologist George Miller, one of the founding fathers of the cognitive psychology, this movement started precisely on the second day of a symposium on Information Theory held at the Massachusetts Institute of Technology on the 11th September 1956.⁵⁹⁰ These were the heydays of behaviourism, but in that moment which brought together then-relatively unknown figures such as Jerome Bruner, Allen Newell, Herbert Simon and Noam Chomsky, a new interpretation of psychology was born that was based not on the study of behaviours and conditioning, but of mental processes instead. Such was the newness of this idea that as Miller himself confessed, he credited his early works on language with a behaviourist influence simply because it was the done thing ‘even though by Skinner’s standards, my book had little or nothing to do with behaviour’.⁵⁹¹ While Bruner and Miller’s early work on cognition proceeded in relative isolation, the straw that broke the behaviourist camel’s back was Noam Chomsky’s 1956 paper on linguistics; it demolished the behaviourist understanding of language acquisition by showing that a purely behavioural account could not explain grammar acquisition.⁵⁹² Chomsky’s pioneering paper paved the way for what some regard as one of the first works of cognitive psychology: *A Study of Thinking* by Bruner, Goodnow and Austin.⁵⁹³

And yet, the very people who broke the hold of behaviourism on American psychology in 1956 were also the authors of a schism that divided cognitive psychology from its very beginnings until the 1990s. On the one hand, at the dawn of computer science, inspired by the workings of computer operating systems and refusing to believe that human problem-solving could be understood simply as trial-and-error, the two young computer scientists Newell and Simon produced a version of cognitive psychology that thought of people as general problem-solvers; it became known as information-processing psychology. Such was the influence of Simon and Newell that their work inspired a whole new area of research into medical problem solving that triggered a rift in the theory of problem-based learning that still survives to this day. On the other hand, inspired by the Swiss psychologist Jean Piaget and his theory of ‘assimilation’ and ‘accommodation’ as well as the Soviet psychologist Lev Vygotsky, authors initially rallying under Jerome Bruner’s banner developed a branch of cognitive psychology concerned with the role of the activation of existing knowledge in knowledge acquisition; this became known as constructivist psychology. The scholarly battle that played out in cognitive psychology was

⁵⁸⁹ As originally reported in : Edward L. Thorndike, ‘Animal intelligence: An experimental study of the associative processes in animals’, *Psychological Monographs: General and Applied*, 2, no. 4 (1898): i-109.

⁵⁹⁰ George A. Miller, ‘The cognitive revolution: a historical perspective.’ *Trends in Cognitive Sciences*, 7, no. 3 (2003): 141–144.

⁵⁹¹ Miller, ‘The cognitive revolution’, 141.

⁵⁹² Noam Chomsky, ‘Three models for the description of language.’ *Information Theory, IRE Transactions on 2* no. 3 (1956): 113-124.

⁵⁹³ According to William Bechtel, Adele Abrahamsen and George Graham, ‘Cognitive Science, History’ In *International Encyclopedia of the Social and Behavioral Sciences* (Oxford: Elsevier Science 2001): 2154–2158.

strongly reflected in PBL research and practice, and this chapter will endeavour to clarify the stakes and outcomes of this intellectual dispute.

The Information-processing Position

This section shall retrace Newell and Simon’s problem-solving theory, expose the manner in which it was applied to medical problem solving by Elstein, Shulman, and Sprafka, and indicate the extent to which these theories impacted the development of problem-based learning. The section concludes by expounding the failure of these theories in providing an explanation for the nature of thinking and learning in general, and in PBL in particular. This paved the way for an alternative context-specific paradigm to understand thinking and problem-solving, which we shall discuss in the next section.

The General Problem Solver

Allen Newell and Herbert Simon were two American computer scientists who dedicated their scientific careers to using computer simulations as a means of understanding the human mind.⁵⁹⁴ They began their work in the field in 1955, and published their pivotal paper ‘Elements of a Theory of Human Problem Solving’ with their colleague Joseph Shaw in 1958.⁵⁹⁵ This was the dawn of a sub-field of cognitive psychology known as information-processing psychology, the main premise of which was that like computers, the human mind acts as a general problem-solving device.⁵⁹⁶ Newell and Simon believed that the process of solving a problem could be considered independently of the content of the problem, and called this process a ‘program’:

The program that a human subject uses to solve mathematical problems will be similar in many respects to the program he uses to choose a move in chess; the program one subject chooses for any such task will resemble the program used by other subjects possessing similar training and abilities. If there were no such similarities, if each subject and each task were completely idiosyncratic, there could be no theory of human problem solving.⁵⁹⁷

In 1959, they developed a computer programme named the ‘General Problem Solver’ which used means-end analysis to solve simple logical problems, and in 1972 they wrote their *magnum opus*, the monumental *Human Problem Solving*, a near-thousand page expounding of their theory of human cognition.⁵⁹⁸ In essence, their theory posited that problem-solving

⁵⁹⁴ Herbert A. Simon, *Allen Newell 1927-1992* (Washington D.C.: National Academies Press. 1977), 141-173. Accessed November 15, 2015. <http://www.nasonline.org/publications/biographical-memoirs/memoir-pdfs/newell-allen.pdf>

⁵⁹⁵ Allen Newell, Herbert A. Simon, and J.C. Shaw, ‘Elements of a Theory of Human Problem Solving’. *Psychological Review*, 65(3) (1958): 151–166.

⁵⁹⁶ A brief explanation can be found in Hergenhahn, *An introduction to the history of psychology*, 545.

⁵⁹⁷ Newell, Simon and Shaw ‘Elements of a Theory’, 152.

⁵⁹⁸ Allen Newell and Herbert A. Simon, *Human problem solving*. (Englewood Cliffs, N.J.: Prentice-Hall. 1972) They summarized their theory as follows:

1. A few, and only a few gross characteristics of the human Information Processing System (IPS) are invariant over task and problem solver.
2. These characteristics are sufficient to determine that a task environment is represented (in the IPS) as a problem space, and that problem solving takes place in a problem space.
3. The structure of the task environment determines the possible structures of the problem space.

consisted of a collection of heuristic pathways used to solve a problem, which together formed a ‘problem space’. This problem space was determined by the external problem situation. Newell and Simon’s research objective, then, was to identify the invariant characteristics within the ‘Human Processing System’ (HPS).

The analogy between human cognition and computer information-processing marked the advent of thirty years of research in this direction. The behaviourists’ ‘stimuli’ were replaced by ‘inputs’, and ‘responses’ by ‘outputs’, along with a whole new range of computing vocabulary transposed into psychology. It may come as a surprise to the reader then to learn that information-processing psychology as a model for thinking, reasoning, and problem-solving died out in 1980s when its premises hit an evidence impasse. Indeed, whilst Newell and Simon’s work spurred innovation in the field of Artificial Intelligence, it failed as a tool for psychology research. Stellan Ohlsson, a student of information-processing, has written a thorough analysis of this failure.⁵⁹⁹ According to him, the trademark of Newell and Simon’s work was their innovative strategy for measuring this elusive ‘general problem-solving’ capability. It consisted in getting participants to voice their cognitive strategies out-loud when confronted with a sample problem. The experimenters recorded these verbal protocols, and then built computer programmes that mimicked the temporal order of the protocols. They would then test the programmes to see if they were capable of solving the sample problem using the thus-apprehended heuristics. If the programme succeeded, the experimenter could claim that he had uncovered the cognitive heuristics used by the human in this problem situation. However, Ohlsson indicated that there were two major problems with this approach. Firstly, the so-called ‘trace data’ (the verbal protocol) was actually problem-specific. Newell and Simon tried to make general claims about problem solving as a context-independent activity, but all of their data varied across people and problems so they were unable to construct one computer model to solve all problems. So much for their ‘General Problem Solver’ (GPS). Secondly, their attempt to produce a general theory of problem solving didn’t work. They posited the existence of an ‘Ur’ strategy that was context-free, of which the GPS was meant to be a representation. But it became rapidly apparent that humans don’t generally engage in means-end analysis but use other cognitive strategies such as analogies, forward search etc. As Newell and Simon’s British contemporary Daniel Berlyne put it:

The fact is that analogies with computer programs, enlightening as they have been, bypass at least two vital aspects of human behavior. [...] First, computers do not undergo fluctuations in the intensity with which they work. Second, they do not decide which tasks they will undertake. The subgoals successfully adopted by a program depend on the ultimate goal that has been imposed on the machine by a human decision.⁶⁰⁰

Berlyne concluded that, as we did not understand how ultimate goals are decided upon by humans, we could not possibly model this with computers or simple information-processing models.

4. The structure of the problem space determines the possible programs that can be used for problem solving.

⁵⁹⁹ Stellan Ohlsson, ‘The Problems with Problem Solving: Reflections on the Rise, Current Status, and Possible Future of a Cognitive Research Paradigm.’ *The Journal of Problem Solving* 5, no. 1 (2012): 101–128.

⁶⁰⁰ Daniel E. Berlyne, ‘Curiosity and learning.’ *Motivation and Emotion* 2, no. 2 (1978): 118.

In addition, the ‘difference-operator’ table that the ‘General Problem-Solver’ used was actually task-specific, not general at all. The defeat of information-processing psychology was not total: the idea of having a limited set of content-independent processes to describe human cognition was transferred to the study of the human cognitive architecture, and later neuroscience. In summary, the theory that problem-solving was a general skill paradoxically triggered a counter-theory that problem-solving was anchored in knowledge acquisition, as one of the early proponents of knowledge acquisition approach put it:

Computer scientists were trying to program computers to do such things as perceive simple objects, translate from one language to another, and play chess. [...] Progress was slow. It became clear that a data driven approach could not possibly work for any but the most simple and trivial of problems. It proved necessary to provide computers with rather elaborate knowledge of the world even to get them to recognize simple objects.⁶⁰¹

Despite these criticisms, the Newell and Simon model of cognition was influential throughout psychology, so it is little surprise to find that it had its defenders in Maastricht. The most ardent information processing advocate was Richard ‘Dick’ Snow, an American psychologist hired as an educational advisor to the Dean of the Medical Faculty and to Wynand Wijnen. Snow would periodically review the educational happenings at Maastricht, including the work of the Department of Education Research and Development, and write recommendations to Wijnen and Tiddens. In one such memorandum dated March 17, 1977, he addressed Schmidt’s nascent research on problem-based learning.⁶⁰² Given the introduction of the memorandum, it seems that Maastricht aimed to develop some type of measurement system of the ever elusive ‘problem-solving skills’ by 1979 – a project in which Snow was involved in an advisory capacity. In this memorandum, Snow used Newell and Simon’s work on problem-solving to develop a taxonomy of patient problems in PBL based on their problem-solving characteristics. For instance, he stated that while some problems require the activation of prior knowledge stored in the long-term memory, many problems could be solved simply on the basis of a feedback loop between short-term memory and problem-solving skills. Even though Snow’s work was deeply anchored in information-processing psychology, he was already beginning to levy some criticism against Newell and Simon – namely, he did not agree that all people had a ‘unidimensional homogeneous’ capacity to analyse the problem situations. Despite this, he still prescribed the teaching of problem-solving skills to Dean Tiddens and Wynand Wijnen. What we witness here is the pervasiveness of the information-processing paradigm, which, perhaps because of psychology’s fascination with computers, survived for decades longer than evidence should have allowed it to. Indeed, it survived long enough to spawn a model of *medical* problem-solving based on information processing psychology that is still pervasive today in problem-based learning curricula: the hypothetico-deductive model.

The Hypothetico-Deductive Model

⁶⁰¹ Richard Anderson, ‘The Notion of Schemata and the Educational Enterprise: General Discussion of the Conference.’ In: *Schooling and the Acquisition of Knowledge* 1st ed., ed. Richard C Anderson, Rand J Spiro and William E Montague (Hillsdale, NJ: Lawrence Erlbaum Associates 1977), 415-431.

⁶⁰² Richard Snow, ‘To: Harmen Tiddens, Wynand Wijnen - 17 March 1977’. Report from 1977. Erasmus University, Private Collection of HG Schmidt. Rotterdam, the Netherlands.

In the late 1970s, information-processing psychology was still in its heydays and spawned all manner of verbal-protocol and trace-data research. These methods were picked up by former college-classmates-turned-colleagues Arthur Elstein and Lee Shulman, working out of Michigan State University.⁶⁰³ Together with Sarah Sprafka, the pair was awarded a research grant by the university with a warrant to uncover the difference between expert and novice problem-solving in medicine. This research culminated in the publication of *Medical Problem Solving* in 1978, one of the world's most cited works of medical education to date.⁶⁰⁴ In it, they attempted to demonstrate the existence of content-independent heuristics of medical problem-solving. Clinicians, they conjectured, went through a process of hypothetico-deduction when faced with a medical problem. This meant that they would engage in the formulation of hypotheses for potential diagnoses, which would be either confirmed or disproved by new data from medical tests on the patient until the most likely hypothesis was left standing. The authors' initial contention was that expert clinicians would fare better at hypothetico-deduction than novices, but their research found no evidence of this. Instead, they were forced to acknowledge that the existence of prior medical knowledge in the particular domain of the problem made a substantial difference in clinicians' ability to solve that problem. However, the influence of information-processing psychology was such that they were not able to surrender the idea of the existence of content-independent heuristic processes:

In our opinion, there is a general mental process common to all medical problem-solving and we have tried to outline it in the model of medical inquiry. However, the effectiveness with which this process is mobilized in any particular case depends on knowledge in a particular domain. The fact that all problems are approached by generating hypotheses and testing them implies that a general hypothetico-deductive method for problem-solving is employed by all physicians.⁶⁰⁵

Instead of seeking a content-driven alternative explanation for the fact that some people appear to be better at problem-solving than others, they sought to explain this with the idea that some heuristics require extensive training.

The influence of the hypothetico-deductive model was channeled into problem-based learning by Howard Barrows, particularly through his 1980 book. We have seen in previous chapters that this book was not reflective of the practice of PBL at McMaster in the early 1970s, but we have also seen that by the mid 1970s, the influence of Barrows and his colleague Neufeld had replaced that of Anderson and Spaulding. The fact that both Barrows and Neufeld supported the idea of hypothetico-deduction had important consequences for McMaster, medical education, and PBL.

Barrows began his research on hypothetico-deduction in the early 1970s, but his most developed argument in favour of content-independent reasoning processes can be found in the publication *Problem-based Learning: An Approach to Medical Education*, a highly popular

⁶⁰³ The history of Elstein's research and his friendship and professional relationship with Shulman is recounted in: William A Anderson, and Illene B Harris, 'Arthur S. Elstein, Ph. D.: Skeptic, Scholar, Teacher and Mentor', *Advances in Health Sciences Education* 8 (2003): 173–182.

⁶⁰⁴ Arthur Elstein, Lee Shulman, and Sarah Sprafka, *Medical problem solving* (Cambridge, Mass.: Harvard University Press, 1978)

⁶⁰⁵ Elstein, Shulman and Sprafka, *Medical problem solving*, 292.

book on PBL which he co-authored with Robyn Tamblyn in 1980.⁶⁰⁶ In this book, the authors dismissed the idea that a physician's clinical reasoning process was a mysterious intuitive 'art', and instead argued that these cognitive skills could and should be taught in medical education. The solution for this was to confront students with patient, health delivery, or research problems, since 'by working with an unknown problem, the student is forced to develop problem-solving, diagnostic, or clinical reasoning skills'.⁶⁰⁷ Like Elstein, Barrows recognized the importance of doctors' prior experience with patients and the breadth of their medical knowledge in the hypothesis-generation process. However, Barrows and Tamblyn interpreted this phenomenon from an associationist point of view rather than a constructivist one:

These hypotheses are usually the product of the clinician's past experience with patient problems. Their appearance from the physician's memory banks is largely an unconscious act of memory association.⁶⁰⁸

In this sense, Barrows argued that increased medical knowledge could even be detrimental to problem-solving skills as more precise knowledge might encourage students to tunnel-vision around what they had learned rather than consider a wider range of hypotheses.⁶⁰⁹ The distinction between content and process knowledge was cemented in Barrows' call for process evaluations that are 'concerned with the student's ability to observe data, solve problems or show aspects of the clinical reasoning process, make clinical decisions and therapeutic decisions, and the like'.⁶¹⁰ Such aspects of the clinical reasoning process were made to include data perception and representation, problem formulation, hypothesis generation, inquiry strategy, diagnostic decisions, therapeutic decisions, time, cost, sequential management, and, finally, the medical information acquired (content knowledge). Therefore, while it would be unfair to claim that Barrows dismissed the importance of prior knowledge in problem-solving as Newell and Simon had, it is clear that the emphasis of his work was on the process of problem-solving via hypothesis generation. He believed that this process could be isolated enough from the specific problem content in which it was practiced to produce some general and teachable mechanisms by which medical problems should be approached; a trait which places Barrows squarely within the information-processing tradition.

This had some deep consequences for McMaster's PBL curriculum. Beginning in 1977, major calls were being issued by faculty and students to reform the original Spaulding curriculum, and the process of change was taken over by Vic Neufeld.⁶¹¹ The new curriculum, progressively rolled out between 1977 and 1984, did away with the strong biomedical nature of the first curriculum and instead focused on priority healthcare problems management.⁶¹² Evidence of this change can be seen through the year-by-year evolution of the education materials found in the McMaster archives between 1975 and 1982, and a great deal of calls for

⁶⁰⁶ Howard S. Barrows and Robyn M. Tamblyn, *Problem-based learning: An Approach to Medical Education* (New York: Springer Pub. Co. 1980)

⁶⁰⁷ Barrows and Tamblyn, *Problem-based learning* 13.

⁶⁰⁸ Barrows and Tamblyn, *Problem-based learning*, 23.

⁶⁰⁹ Barrows and Tamblyn, *Problem-based learning*, 88.

⁶¹⁰ Barrows and Tamblyn, *Problem-based learning*, 113.

⁶¹¹ See for instance: W. Roy, 'Exit Survey Report - Class of 1977.' Report from 1978. McMaster University, Educational Programme Committee - 1977/1978 - HHS/ FHS, Archives Box 233.2;4. Hamilton, Ontario.

⁶¹² The curriculum is described in Peter J. MacDonald et al., 'Setting educational priorities for learning the concepts of population health', *Medical Education* 23 (1989): 429-439

change in the notes of the Education Committee meetings.⁶¹³ In the new curriculum, the students mainly dealt with long descriptions of patient cases compiled on the basis of lists of most commonly experienced medical issues, with a focus on solving the medical problem at hand. The objectives of the Faculty of Medicine were thus revised to read in top position: ‘to identify and define health problems at both an individual and a community level and to search for information to resolve or manage these problems’.⁶¹⁴ In addition, the development of clinical skills became a central feature of the reform efforts. Under the influence of Barrows and Tamblyn, the McMaster clinical skills training programme was constructed to train the students’ skills in encounters with simulated patients.⁶¹⁵ This curriculum lasted until 1993, when, in the face of the high student failure rates in the national medical exam, McMaster abandoned the information-processing approach and adopted a curriculum with many of the content-oriented features from Maastricht University, including the Progress Test.⁶¹⁶

The problems with hypothetico-deductive methods were not confined to medical education: by the mid-1980s, information-processing theory was beginning to crumble as a psychological paradigm. We have already recounted the criticism levied against Newell and Simon, but Elstein and Shulman’s theories attracted their fair share of academic rebuttal. For instance, in 1985, Christine McGuire lamented resilience of the idea of content-independent cognitive skills and abilities:

Professional evaluators [...] wanted to believe in the existence of some generalized kind of cognitive achievement – a related set of skills or developed abilities – that individuals could bring to bear in managing patient problems. They have been pursuing that chimera ever since, despite a mind-numbing torrent of studies that continue monotonously to report the same findings.⁶¹⁷

This critique was levied particularly against Barrows and Tamblyn and their invocation to facilitate the learning of clinical reasoning skills in medical education. The author did not believe that the subjects reported in Barrows’ studies were actually engaging in hypothetico-deduction:

Doubts that these diagnostic labels are genuine hypotheses are considerably exacerbated if, as Barrows and Tamblyn say, they literally ‘pop’ into the clinician’s head within moments of the initial encounter. Such a process appears to be more akin to the act of pattern-matching or to the procedure involved in comparing group phenomena with various templates and selecting best fit.⁶¹⁸

⁶¹³ See for instance, this letter of Phase III Chairman Mo Ali to the Education Committee listing the problems with the programme as it stood in 1977: Mo Ali, ‘To: M.D. Education Committee - January 7, 1977’. Letter from 1977. Educational Programme Committee - 1977/1978 - HHS/ FHS Archives, Box 233.2;1. McMaster University, Hamilton, Ontario. See also this letter of Vic Neufeld to Ron McAuley in which he outlines the work to be done by a new “Task Force” on Faculty objectives: Vic Neufeld, ‘Ref: Proposed terms of reference for MD Program Task force on Objectives - To: Ron McAuley - February 8, 1977.’ Letter from 1977. Educational Programme Committee - 1977/1978 - HHS/ FHS Archives, Box 233.2;1. McMaster University, Hamilton, Ontario.

⁶¹⁴ ‘Objectives of the M.D. Programme (Revised).’ Memorandum from 1978. McMaster University, Educational Programme Committee - 1977/1978 - HHS/ FHS Archives, Box 233.2;4. Hamilton, Ontario.

⁶¹⁵ John Sutton, ‘To: Dr. G.S. Cameron - November 15, 1977.’ Letter from 1977. McMaster University, Educational Programme Committee - 1977/1978 - HHS/FHS Archives, Box 233.2;3. Hamilton, Ontario.

⁶¹⁶ Geoffrey Norman, et al., ‘Assessment steers learning down the right road: Impact of progress testing on licensing examination performance.’ *Medical Teacher*, 32(6) (2010): 496–499.

⁶¹⁷ Christine H. McGuire, ‘Medical Problem-Solving: a critique of the literature.’ *Journal of Medical Education* 60 (1985): 587-595.

⁶¹⁸ McGuire, ‘Medical Problem-Solving’.

This sort of criticism was not widely read in the field of cognitive psychology, but did threaten the solidity of the theoretical basis upon which Barrows and Neufeld had built their version of problem-based learning. In 2002, Elstein became his own harshest critic when he acknowledged that the theory that medical problem-solving was based hypothetico-deduction processes was in large part erroneous.⁶¹⁹ Whilst this theory held true to some extent for the hardest medical problems, most problem, he argued, were actually resolved on the basis of pattern recognition or the construction of a mental model of the problem. Both of these processes were based on the extent of the clinician's knowledge, not on the mastery of heuristics. This, he acknowledged, has such strong implications for problem-based learning that it led to a re-evaluation of the purpose of the method:

Problem-based learning can be understood as an effort to introduce the formulation and testing of clinical hypotheses into the preclinical curriculum. The theory of cognition and instruction underlying this reform is that since experienced physicians use this strategy with difficult problems, and since practically any clinical situation selected for instructional purposes will be difficult for students, it makes sense to provide opportunities for students to practise problem solving with cases graded in difficulty. The finding of case specificity showed the limits of teaching a general problem solving strategy. Expertise in problem solving can be separated from content analytically, but not in practice. This realisation shifted the emphasis towards helping students acquire a functional organisation of content with clinically usable schemas. This goal became the new rationale for problem based learning.⁶²⁰

What was this idea of 'schemas' and how did it become the dominant paradigm for understanding PBL? The organization of content into mental *schemata* came from a second branch of cognitive psychology: constructivism. It was moved to the forefront of PBL research by Maastricht-based researcher Henk Schmidt in the early 1980s.

The Constructivist Position

Although information-processing psychology had a voice in Maastricht early on through the periodic contributions of Dick Snow and Howard Barrows, another approach to understanding PBL began to make headway in Maastricht in the second half of the 1970s. Principally spurred by the academic interests and research of Henk Schmidt, constructivist psychology eventually became the dominant paradigm through which PBL could be understood as a learning process. Having reviewed the contributions of information processing psychology, we shall now turn our attention to understanding constructivist psychology, weaving it into the intellectual history of Maastricht's PBL as we go. We begin with an exposition of the ideas of Jean Piaget and Lev Vygotsky, even though neither was known nor read at Maastricht University (or at McMaster for that matter). No serious attempt was made to tie their theories directly into psychological research on PBL; but these ideas were so fundamental to the development of later cognitive psychology that it would be impossible to understand the influence of the later constructivists on PBL research without a synthesis of the theories of the two founding giants of the field. In fact, the synthesis of Piagetian and Vygotskian ideas made by Bruner became a staple reference in Schmidt's PBL research from the mid-1970s onwards.

⁶¹⁹ Arthur S. Elstein, and Alan Schwarz, 'Clinical problem solving and diagnostic decision making: selective review of the cognitive literature.' *British Medical Journal* 324, no. 7339 (2002): 729–732.

⁶²⁰ Elstein and Schwarz, 'Clinical problem solving', 731.

The dawn of constructivism: Piaget v. Vygotsky

A couple of years after the end of the Second World War, Piaget formulated a strong criticism of the *Gestalt* interpretation of learning:

There is no reason why complex structures should not be regarded as the product of a progressive construction which arises, not from ‘syntheses’, but from adaptive differentiations and combined assimilations, nor is there any reason why this construction should not be related to an intelligence capable of genuine activity as opposed to an interplay of pre-established structures.⁶²¹

Like the *Gestaltists*, Piaget saw that the mind was capable of handling information in wholes. Unlike the *Gestaltists*, Piagetian theory hypothesized that information could be grouped in the mind, and these groups could interoperate.⁶²² Since all cognition could be understood in these terms, reality could only be accessed through mental constructions – as Bruner put it: ‘for Piaget knowledge of the world is made, not found’.⁶²³ He proposed an alternative understanding of learning and intellectual growth as the ability to assimilate information into existing mental constructions of the world (known as *schemata*) or to modify those *schemata* to accommodate the new information in a process known as *deséquilibration*. Piaget never really provided a clear explanation for this process, which prompted Bruner to say about him that he was more interested in descriptions than explanations, and that ‘the theory, in consequence has become more a theory of the direction of growth than of the cause of growth’.⁶²⁴

As a developmental psychologist, Piaget developed his ideas on the basis of his observations of the intellectual growth of children, and therewith distinguished distinct invariant stages of childhood intellectual development, which all normally constituted children would go through as they matured. Piaget never took much interest in the intellectual development of adults or in adult learning, as he considered that once adult age had been reached, cognition lay outside of the scope of developmental psychology. Piaget’s main works, such as *The Language and Thought of the Child* and *The Origins of Intelligence in Children* pre-date the cognitive revolution.⁶²⁵ In fact, his most important works and theories were written between 1915 and 1950. Although very influential in developmental psychology in the early twentieth century, it was not until the publication of *A Study of Thinking* in 1956 by Bruner, Goodnow and Austin⁶²⁶ that his ideas were applied in the realm of human cognition in general and penetrated American psychology, which was hitherto dominated by Skinner and the behaviourists. The present Piagetian heritage within cognitive psychology could be traced through the extensive and on-going reinterpretation of his works by later psychologists throughout the twentieth and

⁶²¹ Jean Piaget, *The Psychology of Intelligence (Routledge Classics)* 2nd ed. Kindle edition (Routledge, 2003), 70. Note: this is the English translation. The original dates from 1947.

⁶²² Piaget, *The Psychology of Intelligence*, 42.

⁶²³ Jerome Bruner, ‘Celebrating divergence: Piaget and Vygotsky’. Keynote address delivered in Geneva on 15th September 1996 at a joint meeting of the Growing Mind Conference in honour of the centennial of Jean Piaget’s birth, and the Vygotsky-Piaget Conference of the 2nd Congress of Socio-Cultural Research, 125.

⁶²⁴ Bruner, ‘Celebrating divergence: Piaget and Vygotsky’, 127.

⁶²⁵ Jean Piaget, *The language and thought of the child* (Vol. 5) (Psychology Press, 1959); J. Piaget, *The origins of intelligence in children* (Vol. 8) (New York: International Universities Press, 1952)

⁶²⁶ Jerome Bruner, Jane Goodnow and George Austin, *A study of thinking* (New York: Wiley, 1956).

twenty-first century,⁶²⁷ but this would be an arduous endeavour that is outside the scope of this treatise, so here we shall focus on the contemporary Vygotskian critique and the later Brunerian synthesis of both ideas.

The most serious contemporary challenge to Piaget's theories came from a young Russian psychologist, Lev Vygotsky. The latter avidly read Piaget's early work and deconstructed it to produce his own theories in his *magnum opus* from 1934, a book later translated as *Thought and Language*.⁶²⁸ According to his biographer Alex Kozulin, Vygotsky was only able to submit his manuscript in rushed form, since he died of tuberculosis a few months following.⁶²⁹ Perhaps because of his untimely demise, his work was not translated or accessible to the West until the 1950s. Even so, translations available to the West were heavily edited and the full text of *Thought and Language* was not available in English until Kozulin translated it in 1986. Vygotsky disagreed with Piaget on several points. While Piaget might have seen children as autistics by nature who are forced out by socialization, Vygotsky saw children as social by nature and found no contradiction or conflict between the social world and the inner world – in fact, he believed that understanding thought required an understanding of the cultural context in which language developed. This led him to believe that Piaget was wrong to assign invariant developmental stages to children. Instead, Vygotsky argued, every child had a *Zone of Proximal Development*, a figurative place where children's unstructured and experiential concepts would meet adults' logical thinking. In this zone, with the help of the more knowledgeable adult, the thinking of the child would crystalize and move him to the next stage of intellectual development – how far the child was able to move would depend on his pre-existing mental abilities and knowledge. Thus, Vygotsky argued, instruction often preceded development, and not the other way around, as Piaget would have had it. Vygotsky's criticism may well have remained unknown to Western educational psychology had they not been seized by Jerome Bruner in the late 1950s.

The Jerome Bruner Synthesis

Jerome Bruner joined Harvard University in 1945 where he met fellow cognitive psychology pioneer George Miller, with whom he founded the Harvard Centre for Cognitive Studies.⁶³⁰ Bruner ran the Centre from 1960 to 1972, during which time he laid the foundations of his key theories, namely 'learning by discovery' and 'scaffolding', in some of his major works on education: *The Process of Education*, published in 1960, and *Towards a Theory of Instruction*, published in 1966.⁶³¹

⁶²⁷ An argument supported by historian of psychology Hergenhahn, *An introduction to the history of psychology*, 537-540.

⁶²⁸ Lev S. Vygotsky, *Thought and Language*, trans: Alexander Kozulin (Cambridge, Mass: The MIT Press, 1986)

⁶²⁹ Alexander Kozulin, 'Vygotsky in Context'. Preface to Vygotsky, *Thought and Language*, xi-lxi.

⁶³⁰ Their meeting and mutual influence is described by Miller in a short historical piece on the cognitive revolution. Miller, 'The cognitive revolution', 141–144; see also: "Jerome S. Bruner", Encyclopædia Britannica Online, accessed October 14, 2015, <http://www.britannica.com/biography/Jerome-S-Bruner>.

⁶³¹ Jerome Bruner, *The process of education* (Cambridge, MA: Harvard University Press, 1960); Jerome Bruner, *Toward a theory of instruction* (Cambridge, MA: Belknap Press of Harvard University, 1966)

When Bruner began his work in psychology, Piaget and Vygotsky had already written their most important books, but these were relatively unknown outside of Europe. When he wrote *A Study of Thinking* with Goodnow and Austin, what he was proposing was completely new, as noted by the authors:

To the reader conversant with contemporary American psychology, the book will appear singularly lacking in the more familiar forms of theoretical discourse. Neither the language of learning theory, of Gestalt theory, nor of psychoanalysis will be evident save in the form of incidental reference. For our objective has not been to extend reinforcement theory or the theory of traces or any other prepared psychological proposition to the problem of categorizing. We have not ignored the rich theoretical backgrounds of contemporary theory. Rather, we have come gradually to the conclusion that what is most needed is the analysis of categorizing phenomena - as represented by studies of concept attainment, generalization, and abstraction - as an adequate analytic description of the actual behavior that goes on when a person learns how to use defining cues as a basis for grouping the events of his environment.⁶³²

In this quote we find an obvious reference to the Piagetian concept of ‘groupings’ to describe constructive mental processes. Indeed, references to Piaget form the backbone of the authors’ argument throughout the book – mental processes are referred to in terms of ‘operations’⁶³³ and their descriptions of learning resemble ‘assimilation’ and ‘accommodation’.⁶³⁴ These ideas were obviously not new, but their application to adult learning and thinking in general was. Not only was *A Study of Thinking* a radical departure from behaviourism, but it also implied an opposition to the information-processing paradigm. Indeed, the authors did not subscribe to the metaphor of persons as general problem solvers as Newell and Simon did – they saw a far greater role of non-rational categorization and ‘hanging on’ to prior experience as the basis for thinking, sometimes at the expense of logic. Although this cannot be assimilated *per se* with the idea of ‘activation of prior knowledge’, it marks the recognition that prior experience biases our thinking, sometimes illogically. *A Study of Thinking* formed the basis of Bruner’s general psychological work, but many of his later works were concerned more specifically with education. The seeds of Bruner’s interest in education were sown in his short but popular 1960 book *The Process of Education*, which he wrote at the outcome of an education conference held at Woods Hole in 1959.⁶³⁵ This booklet, although steeped in Piagetian models of development, provides some criticism of the invariance of Piaget’s model. Like Vygotsky, Bruner suggested that instead of matching the level of instruction to the supposed level of intellectual maturity of a child, instruction should push a child further along in his intellectual growth. The book also introduced the concept of ‘discovery’ as an important element of learning, with the famous example of a sixth-grade class that learnt the principles of geography by placing cities on an empty map of the USA according to their own ideas of what cities might need to flourish.⁶³⁶ ‘Discovery’ was framed as the confrontation between a child’s intrinsic interest in learning and a problem that was relevant to him. The idea of ‘learning by discovery’ was further expanded in Bruner’s 1961 paper *The Act of Discovery* in which he likened the education of a schoolchild with the work of a scientist.⁶³⁷ In this paper, he re-iterated the

⁶³² Bruner, *The process of education*, 23

⁶³³ Bruner, *The process of education*, 10

⁶³⁴ Bruner, *The process of education*, 44

⁶³⁵ Bruner, *The process of education*, xvii

⁶³⁶ Bruner, *The process of education*, 19-20.

⁶³⁷ Jerome Bruner, ‘The act of discovery.’ *Harvard Educational Review* 31 (1961): 21-32.

importance of intrinsic motivation as a basis for learning, in explicit opposition to extrinsic reinforcement-based ideas of learning. He also noticed that when children were told to figure out their own mnemonics to remember a pair of words, they learned the pair better than if the memory-aid was handed to them. Thus, he concluded:

Let me suggest that in general, material that is organized in terms of a person's own interests and cognitive structures is material that has the best chance of being accessible in memory. [...] In sum, the very attitudes and activities that characterize "figuring out" or "discovering" things for oneself also seem to have the effect of making material more readily accessible in memory.⁶³⁸

Bruner's foremost statement of his education theory came in 1966 with *Towards a Theory of Instruction*. In this manuscript, he expanded upon the ideas that he had previously brought forward, and proposed new and more detailed interpretations of the nature of learning, the role of teachers and of schooling. Bruner had already hinted towards his support of Vygotsky's position on instruction in his previous works, but this is stated in unmistakable terms in *Towards a Theory of Instruction* in which he recognized the importance of cultural embeddedness in the child's learning process, and re-iterated that instruction of any subject or skill could be given to any child based on materials appropriate to his logical forms, provided they were challenging enough but not too much, even if this meant the subject must be covered again at a later date in more depth (this is what Bruner called a 'spiral curriculum').⁶³⁹ This idea was inspired by Vygotsky's Zone of Proximal Development, and although the word "scaffolding" was not coined until 1976,⁶⁴⁰ its basic tenets were already described here by Bruner:

I suspect that much of growth starts out by our turning around on our own traces and recoding in new forms, with the aid of adult tutors, what we have been doing or seeing, then going on to new modes of organization with the new products that have been formed by these re-codings. [...] The new models are formed in increasingly powerful representational systems. It is this that leads me to think that the heart of the educational process consists of providing aids and dialogues for translating experience into more powerful systems of notation and ordering.⁶⁴¹

Bruner has written over fifteen books on education, cognitive psychology and developmental psychology, and well as numerous journal articles and conference papers on the subject, but our inquiry focused on the works that were most influential during the time that Maastricht University was founded.

Bruner's distinctive influence on PBL research in the Department of Educational Research and Development is apparent in the large amount of ink that Schmidt spent on describing and criticising Bruner's 'Learning by Discovery' in his work from the end of the 1970s and early 1980s. Indeed, although citing discovery learning as an inspiration for PBL, he was keen to point out the shortcomings of Bruner's method and the advantages of problem-based learning in terms of knowledge acquisition:

⁶³⁸ Bruner, 'The act of discovery', 32

⁶³⁹ Bruner, *The process of education*, 52

⁶⁴⁰ David J. Wood, Jerome S. Bruner and Gail Ross, 'The role of tutoring in problem solving.' *Journal of Child Psychiatry and Psychology* 17, no. 2 (1976): 89-100.

⁶⁴¹ Bruner, *Toward a theory of instruction*, 21.

Ontdekkend leren moet echter wel onderscheiden worden van wat wij probleemleren genoemd hebben. Bij het ontdekkend leren vindt de leerling de kennis die hij nodig heeft voor het oplossen van een probleem zelf uit, hij produceert als het ware zelf nieuwe feiten, regels en principes, terwijl hij aan het probleem werkt. In de praktijk blijkt dit vaak een tamelijk moeizame aangelegenheid te zijn. Het tempo waarmee die nieuwe kennis geproduceerd wordt ligt laag en daarbij komt nog dat sommige kennis die mensen zich moeten eigenmaken zo gecompliceerd is dat het maar zeer de vraag is of ze die ooit zelf kunnen produceren. [...] In de wijze waarop probleemleren plaatsvindt is geprobeerd deze tekortkomingen van ontdekkend leren te vermijden.⁶⁴²

Instead, Schmidt argued, problem-based learning went further than just producing hypotheses – students would be required to compare these tentative ideas to what was being said about a particular problem in the relevant scientific literature. This, Schmidt expounded, allowed the student to learn at a pace more suited to the ‘complexity of our modern society’.⁶⁴³ Given the shortcomings of Bruner’s theories in accounting for knowledge acquisition in PBL, Schmidt rapidly turned instead to the work of later constructivist psychologists such as Richard Anderson.

Knowledge Acquisition

It was not until the late 1970s that constructivist psychology really took on the challenge of explaining the ideas that Piaget had left open. By that time, it was increasingly evident that Human Information Processing Theory would not be able to explain human thinking, and the path was clear for a post-Piagetian interpretation of mental operations.

By the late 1970s, a growing number of experimental psychologists, such as Andrew Ortony, Rand Spiro and David Ausubel, were looking into information encoding and retrieval in an attempt to explain the way knowledge is stored and reconstructed for recall. These psychologists followed on from the Piagetian heritage by making Schema Theory the centre-point of their work. Even though they seldom explicitly referred to Piaget, they expanded on his notion of the schema by providing it with the scientific specificity that the Swiss psychologist was lacking. Under their pen, *schemata* were understood as mental ‘frames’ or ‘scripts’ that contained ‘slots’ or ‘placeholders’ that could be ‘instantiated’ by elements in a situation.⁶⁴⁴ Although all of these names made their way into Schmidt’s research on PBL in the late 1970s and early 1980s, the work of Richard Anderson returned with more consistency and force than the others:

I am not sure whether Piaget already saw that new knowledge is actually *constructed* with the help of one’s prior knowledge (the cognitive constructivist point of view). This point of view was most clearly voiced by Richard C. Anderson’s paper on the role of schemata in the acquisition of knowledge (Anderson, 1977).

⁶⁴² Henk G. Schmidt, ‘Leren met problemen, een inleiding in probleemgestuurd onderwijs’. In *Handboek voor de onderwijspraktijk*, (Deventer: Van Loghum Slaterus, 1979), 14. Translates as: “Learning by discovery must be distinguished from what we have called problem-based learning. Through learning by discovery, the learner must uncover the knowledge he needs to solve a problem on his own – he produces new facts, rules and principles, as it were, while he works on the problem. In practice, this is often a rather difficult undertaking. The tempo at which this new knowledge is produced is quite low, and it sometimes happens that some of the knowledge that people must acquire is so complicated that one could ask oneself whether they will ever be able to produce it. Problem based learning has been set up in such a way as to remediate the shortcomings of learning by discovery.”

⁶⁴³ Ibid.

⁶⁴⁴ Richard C. Anderson, Rand J. Spiro and Mark C. Anderson, ‘Schemata as scaffolding for the representation of information in connected discourse.’ *American Educational Research Journal* 15, no. 3 (1978): 433–440.

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[...] I saw the significance of this idea for PBL immediately. What students were doing while discussing a problem was activating prior-knowledge in order to make sense of that problem. If the problem was sufficiently complex (but adapted to their level of knowledge) the need for new knowledge would arise and self-directed learning would satisfy that need. Since relevant prior knowledge was already activated, the new information would be more easily integrated. That this indeed leads to better learning is what I have shown in my PhD-thesis published in 1982.⁶⁴⁵

Anderson's 1977 paper, which was published as concluding remarks to a set of conference proceedings, delves further into the Piagetian tradition than the works of Spiro or Ortony, by expanding on and explaining the concepts of assimilation and accommodation, where Piaget had merely supposed a vague process of *deséquilibration*.⁶⁴⁶ Anderson posited that *schemata* could not be the simple aggregation of response components, perceptual features, semantic features, functional attributes and the like – instead, *schemata* could only be understood in terms of their emergent properties. This insight, inspired in part by the *Gestalt* School, enabled Anderson to venture a hypothesis as to how *schemata* are used (assimilation) and how they change (accommodation). Clarifying his position on the assimilative use of *schemata*, Anderson clearly positioned himself in the constructivist school of thought:

Few episodes are identical. Even if the normal stimuli in two situations were the same, people change. They come to similar situations with different perspectives and different intentions; they play different roles. It follows that people do not function by selecting the right template from a great mental warehouse of templates abstracted from prior experience. The process must be more dynamic.⁶⁴⁷

Based on this assumption, it became clear that individual stimuli, such as words on a page or even abstract concepts, were not the triggers of assimilative mental representation – the trigger lay instead in the meaning of the message conveyed by the sentence or situation, and if that was the case, then people were likely to infer details of a situation based on the schema associated therewith – even if those details were not explicit in the situation description! Conversely, persons with no prior knowledge of a situation would find it hard to understand or remember what they were seeing or hearing, even if the individual components of the situation made sense. The example of this most commonly given is a seemingly jumbled text that makes no sense unless one is given a 'key word' to unlock its meaning, or which could be seen from two different perspectives depending on which 'key word' was given to activate the appropriate existing schema.⁶⁴⁸ As a result of his theory of assimilation, Anderson delivered a scathing critique of traditional top-down instruction:

The foregoing picture of language and language comprehension stands in stark contrast to the one which Olson (Chapter 3, this volume) tells us predominates in the schools. It is, he says, a naïve view, which "assumes that the effects of that knowledge can be translated into words. Symmetrically; words can be translated into knowledge, hence, one can learn, that is, acquire knowledge, by being told." For reasons

⁶⁴⁵ Henk G. Schmidt, personal communication with the author, July 8, 2015.

⁶⁴⁶ Richard Anderson, 'The Notion of Schemata and the Educational Enterprise: General Discussion of the Conference.' In: *Schooling and the Acquisition of Knowledge*, ed. Richard Anderson, Rand Spiro and W. Montague (Hillsdale, NJ: Lawrence Erlbaum Associates, 1977), 415-431.

⁶⁴⁷ Anderson, 'The Notion of Schemata', 421.

⁶⁴⁸ Anderson, 'The Notion of Schemata', 426. To support his theory, Anderson asked participants to study a text describing the contents of a house, furniture, home appliances, TV, etc. When he subsequently asked his subjects to activate the perspective of a homeowner, or the perspective of a thief, participants actually recalled different elements of that same text. See: Richard C. Anderson and James W. Pichert, 'Recall of previously unrecallable information following a shift in perspective.' *Journal of Verbal Learning and Verbal Behavior* 17 (1978): 1–12.

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important in the history of Western culture and important for sustaining a technological society, this naïve view is embodied in written text. Text is supposed to be completely explicit, maintain a fixed meaning in any context and stand autonomous without the need or special interpreters, nor, presumably, for an interpretive framework. While the idea of autonomous text has considerable social utility, it would appear to be wrong, or, at least, to have maladaptive side effects. Text is gobbledygook unless the reader possesses and interpretive framework to breathe meaning into it.⁶⁴⁹

Although Anderson dedicated much ink to picking apart Piagetian assimilation, he also attempted to explain the murkier concept of accommodation. His theory is not dissimilar to the *gestalt* switch idea except that the recognition of the unsuitability of a schema to a given situation is a more gradual process brought about by untenable cognitive dissonance.⁶⁵⁰ Although people are extremely reluctant to change their *schemata*, they also attempt to preserve cognitive consistency, and when the latter tendency wins over and a schema change is engaged, the acquisition of knowledge truthfully begins. Thus, Anderson saw accommodation as a *sine qua non* condition of learning: ‘I suspect that large-scale accommodation may be a dialectical process which entails a confrontation with difficulties in one’s current schema and coming to appreciate the power of an alternative’.⁶⁵¹ With this, Anderson concluded that Socratic methods of instruction would be more conducive than didactic instruction at forcing accommodation. Anderson’s explanation paved the way for Schmidt’s idea that problems, by offering realistic situations for students to work with, could activate students’ existing *schemata* (built from their prior knowledge of these situations) and thus provide the basis for sense-making that is essential to learning.⁶⁵² The development of this theory was a slow process that began shortly after the opening of Maastricht Faculty of Medicine and ripened in 1983. We can see from archival evidence that when the research efforts began in earnest in 1977, although at the time the education research group’s ideas on learning in PBL were a little haphazard – a note in the tutor training manual *Het Tutorensysteem* indicates that the researchers believed that the strength of PBL lay in the promotion of knowledge retention and transfer, but without further specification.⁶⁵³ In fact, the text indicates that the authors, including Schmidt and his colleague Peter Bouhuijs, were aware of the limitations of contemporary research in the field. By 1979, Schmidt had developed more precise ideas on this. He elaborated on his previous work with a paper entitled *Leren met Problemen* and for the first time referred to the activation of prior knowledge and Ausubel’s take on Schema Theory:

Al studierend doen studenten dus kennis op die hun bestaande cognitieve structuur met betrekking tot het bestudeerd onderwerp nader differentieert en die lege plekken in die structuur opvult. En omdat die cognitieve structuur door de beschreven procedures geactiveerd is, valt de bestudeerde kennis in – om het zo maar eens te zeggen – omgeploegde aarde. De onderwijspsycholoog David Ausubel is van mening dat het activeren van wat iemand weet de belangrijkste factor is die het leren van nieuwe dingen beïnvloed.⁶⁵⁴

⁶⁴⁹ Anderson, ‘The Notion of Schemata’, 423.

⁶⁵⁰ Anderson, ‘The Notion of Schemata’, 427. Although some people are more tolerant to cognitive dissonance than others and happily adopt a “playing the game of school” schema that blatantly contradicts their experiential *schemata*! Anderson calls this “cognitive segregation”.

⁶⁵¹ Anderson, ‘The Notion of Schemata’, 429.

⁶⁵² Henk G. Schmidt ‘Problem-Based Learning: Rationale and Description’, *Medical Education* 17 (1983) 11–16.

⁶⁵³ Peter Bouhuijs et al., ‘Het tutorensysteem.’ Guide book from 1977. Erasmus University, Private Collection of H.G. Schmidt. Rotterdam

⁶⁵⁴ Henk G. Schmidt, ‘Leren met problemen: een inleiding in probleemgestuurd onderwijs.’ Working paper from 1979. Erasmus University, Private Collection of H.G. Schmidt. Rotterdam, 8. Translates as: Whilst studying, students take on knowledge that further differentiates their existing cognitive structure with regards to the subject

At this point, Schmidt's work was fully aligned with the constructivist credo that people do not passively ingest the outside world but instead constantly attempt to give meaning to it through personal interpretations of what their senses tell them. His bibliography was already headed in a distinctly cognitive-psychological direction, with references to Miller and Bruner, among others, but also references to *Gestaltists* such as Luchins.⁶⁵⁵ Although his work from 1977 to 1980 marked the beginnings of Schmidt's forays into cognitive psychology, it was his 1983 paper that crystalized its application to PBL. In this paper, he offered three connected explanations of the learning process that takes place in PBL: the activation of prior knowledge; encoding specificity (the similarity between the situation in which knowledge is learned and the situation in which it is applied); and elaboration of knowledge.⁶⁵⁶ By this stage, his research had expanded well beyond the work of Anderson and Ausubel and was aggregating reports from all over the blooming field of cognitive psychology. Schmidt's later article on the foundations of problem-based learning provided some elaborations of these three ideas, but the central themes remain the same to this day.⁶⁵⁷ While the explanations of the learning process of Anderson, Ausubel and others offered some improvements on Piaget's work, some things, such as the trigger for preferring accommodation to assimilation, remained unclear. This was also a puzzle for the study of PBL: why would a student want to engage in PBL at all if it placed them in the uncomfortable position of needing to reconsider their existing *schemata*? In that regard, theories of epistemic curiosity came to complement theories of knowledge acquisition.

Epistemic Curiosity

The notion of epistemic curiosity was first developed by the British-Canadian psychologist Daniel Berlyne in 1954.⁶⁵⁸ Berlyne was a behavioural psychologist concerned with motivation theory – his primary interest was understanding both human and animal curiosity and exploratory behaviour, which he suggested were not tied to the primary drives of hunger, thirst and sex.⁶⁵⁹ Instead, he suggested, mammals display behaviour that can only be explained by the drive for exploration, play or amusement:

When mammals, however, are freed from urgent demands, they may spend some of their time sleeping or resting but devote much of it to activities, whether we class them as 'exploration', 'play', or 'amusement', whose only function can be to expose their sense organs to stimulation.⁶⁶⁰

of study and that fills up the empty slots in this structure. Because this cognitive structure is activated through the procedures described above, the knowledge studied falls, so to speak, on ploughed earth. The education psychologist David Ausubel believes that the activation of prior knowledge is the most important factor in the learning of new things.

⁶⁵⁵ Schmidt, 'Leren met problemen', 13.

⁶⁵⁶ Schmidt, 'Problem-Based Learning: Rationale and Description.'

⁶⁵⁷ Henk G. Schmidt. 'Foundations of problem-based learning: some explanatory notes.' *Medical Education* 27, no. 5 (1993): 422–432.

⁶⁵⁸ Daniel E. Berlyne, 'A Theory of Human Curiosity.' *British Journal of Psychology* 45, no. 3 (1954): 180–191.

⁶⁵⁹ Vladimir J. Konečni, 'Daniel E. Berlyne (1924-1976): Two Decades Later', *Empirical Studies of the Arts*, 14, no. 2 (1996): 129–142.

⁶⁶⁰ Daniel E. Berlyne, 'Curiosity and learning', *Motivation and Emotion* 2, no. 2 (1978): 124.

Although trained in the school of Hullian behaviourism, Berlyne developed a new ‘collative’ theory of motivation that was not tied to classic reinforcement theory. Instead, he hypothesized that epistemic curiosity, defined as a ‘motivational state (a state of high drive or arousal) that actuates quests for knowledge and is relieved by acquisition of knowledge’ was tied to the *degree of conceptual conflict* or conflict between thought, beliefs and attitudes (symbolic response tendencies).⁶⁶¹ This was in turn determined by four factors: how many thoughts, beliefs and attitudes were in conflict; how strong these thoughts, attitudes and beliefs were; whether they were of equal strength relative to each other; the extent to which they were incompatible.⁶⁶² Even though he worked with Piaget for a year and co-authored some publications with him, Berlyne remained rather critical of the advent of cognitive psychology and information processing models alike because of their strict focus on inner mental states at the expense of motivation.⁶⁶³ The idea that the discrepancy between actual and required knowledge would motivate students to study first appeared in Maastricht in the 1977 tutor training manual *Het Tutorensysteem* in a brief description of the nature of PBL:

Een tweede veronderstelling is dat studenten aan de konfrontatie met medische problemen op elk moment van hun studie het te bereiken einddoel ervaren. Dit wordt een sterk motiverende factor geacht om via intensief studeren de diskrepantie tussen feitelijke en vereiste kennis en vaardigheden op te vullen.⁶⁶⁴

But the real uptake of Berlyne’s theories in PBL research came under the name of ‘intrinsic motivation’, in the early 1980s when Schmidt published *Intrinsieke Motivatie en Studieprestatie: Enkele Verkennende Onderzoekingen* as part of his PhD thesis:

I assumed that epistemic curiosity (Berlyne, 1960), aroused by the confrontation with shortcomings in one’s knowledge of the world would lead to better learning. I studied the effects of PBL on the arousal of epistemic curiosity in the same early years (Schmidt, 1983). This theme became however only successful 30 years later in the collaboration with Jerome Rotgans (Rotgans and Schmidt, 2014) under the umbrella of ‘situational interest’.⁶⁶⁵

In this study, Schmidt hypothesized that students confronted with a problem-induced conceptual conflict would use epistemic curiosity to reduce the resulting cognitive uncertainty.⁶⁶⁶ To test this, he set up two experiments in which he first measured the extent to which problem analysis in PBL promotes intrinsic motivation, and then tested the relationship between intrinsic motivation and study performance. The first experiment showed that people who had undergone the problem analysis process (discussion phase) were indeed more likely to seek out more information afterwards, thus validating Berlyne’s model. The second experiment, however, showed no significant relationship between intrinsic motivation and study results – an outcome explained by Schmidt as the result of the reduction of cognitive

⁶⁶¹ Daniel E. Berlyne, ‘Uncertainty and Epistemic Curiosity’, *British Journal of Psychology* 53, no. 1 (1962): 27–34.

⁶⁶² See Berlyne ‘A Theory of Human Curiosity’.

⁶⁶³ Konečni, ‘Daniel E. Berlyne’

⁶⁶⁴ Bouhuijs et al., ‘Het tutorensysteem’, 3. Translates as: A second assumption is that students confronted with medical problems at every moment of their study experience the ultimate goal that they are seeking to achieve. This is a strong motivating factor for students to fill the discrepancy between actual and required knowledge and skills through intensive study.

⁶⁶⁵ Schmidt, in correspondence with the author, July 8, 2015.

⁶⁶⁶ Henk G. Schmidt, ‘Intrinsieke motivatie en studieprestatie: enkele verkennende onderzoekingen’ (Intrinsic motivation and achievement: some investigations), *Pedagogische Studiën* 60 (1983): 385-395.

incongruences prior to the testing phase of the experiment. This, he surmised, must be the result of intrinsic motivation as a situational phenomenon, rather than a long-term process. Schmidt and his colleagues were still pursuing this line of inquiry at the time of writing.⁶⁶⁷

The Maastricht educational path

In summary, the situation in the first ten years of the Faculty of Medicine in Maastricht was as follows: PBL was adopted as a political move by Tans and Tiddens, and the *basisfilosofie* of 1972 is evidence enough that they had no specific theoretical penchants when then enshrined the method into their constitutional document. Although the pedagogy was borrowed from McMaster, the debate between behaviourist and Rogerian ‘humanist’ approaches to education was not transposed to Maastricht – most likely because it had already been resolved some years prior and was simply not seen as an issue by the Maastricht pioneers. However, the educational advisors that poured into the young medical Faculty, such as Snow, Neufeld and Barrows, brought with them an understanding of PBL heavily influenced by information-processing psychology. What ensued were essentially three crucial years of intellectual debate, between 1977 and 1979, from which constructivism emerged as the only viable research paradigm for PBL. This intellectual dispute not only shaped PBL research in Maastricht, but continues to this day to divide PBL educators across the globe, as evidenced by Schmidt and colleagues’ 2009 paper on the subject.⁶⁶⁸ This section will provide a historical account of the pivotal period of 1977-1979, explain the unbridgeable intellectual rift between Barrows and Schmidt, and conclude with the important historical consequences of this dispute for PBL as it is practiced today.

Setting the scene (1972-1977)

As we have seen, at the dawn of PBL, precious little attention was paid to the cognitive processes underpinning learning in a PBL setting. As far as the founders of McMaster were concerned, the method seemed to work and was grounded in principles imparted by intellectual inspirations from Flexner to Rogers. Barrows worked in relative isolation, and his work had little bearing on the practice of PBL at McMaster in its early years but – and this is where our present chapter departs from the previous – the fact that Barrows was publishing his ideas whereas the founders of McMaster were not had significant consequences for the further development of PBL around the world, with a particular impact on the intellectual debate taking shape in Maastricht! The story takes root in the early 1970s, when Howard Barrows, inceptor of the simulated patient, took it upon himself to demonstrate that his educational aids could be used to improve ‘clinical reasoning skills’, ‘problem-solving skills’, ‘diagnostic skills’ and other variations thereof. The first apparent results of this research appeared in 1972, under the title ‘The diagnostic (problem-solving) skill of the neurologist’, in which it was claimed

⁶⁶⁷ See for instance : Jerome I. Rotgans and Henk G. Schmidt, ‘Situational interest and learning: Thirst for knowledge’, *Learning and Instruction* 32 (2014), 37-50.

⁶⁶⁸ Henk G. Schmidt et al., ‘Constructivist, Problem-Based Learning Does Work: A Meta-Analysis of Curricular Comparisons Involving a Single Medical School’, *Educational Psychologist* 44, no. 4 (2009): 227–249.

that hypothetico-deduction could be equated to a ‘cognitive hat rack’ for organizing the information acquired during the patient interview.⁶⁶⁹ Barrows worked closely with Vic Neufeld on this research – neither of them having a prominent role in the curriculum development at McMaster at that time. Neufeld studied medical education at Michigan State University, where Elstein and Shulman were doing their work and according to their research assistant Geoffrey Norman, the Barrows-Neufeld duo ‘had a close relation’ with the Elstein-Shulman team.⁶⁷⁰ It is therefore unsurprising that Barrows borrowed so heavily from the theory of hypothetico-deduction to support his ideas. This research culminated in a paper written in 1977, in which not only was the ‘hat rack’ idea alive and well, but prior knowledge was clearly relegated to a secondary relevance.⁶⁷¹ They developed a model of medical problem solving which would be of crucial importance in the later debates on PBL:

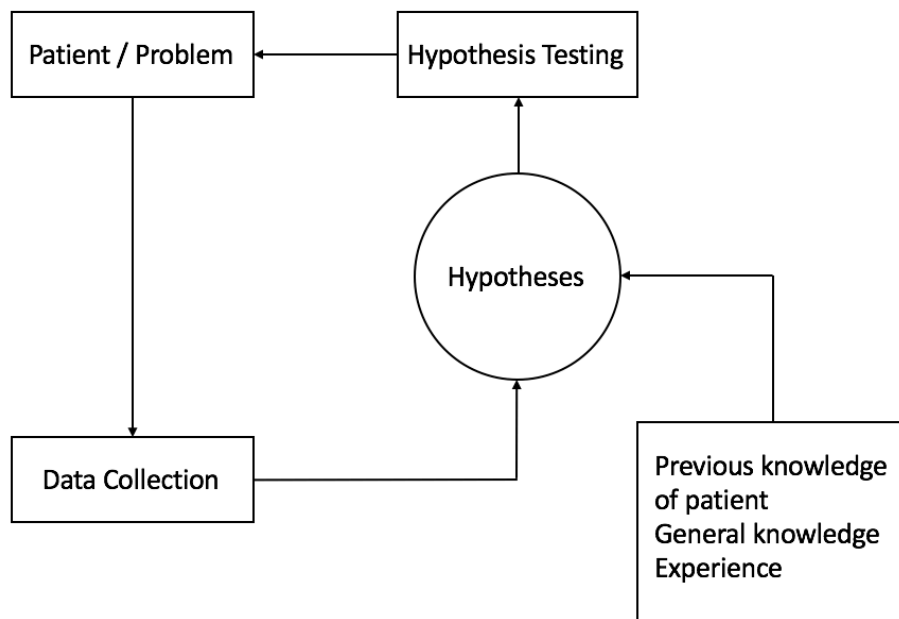


Figure 7: The Hypothetico-Deductive Model of Feightner, Barrows, Neufeld & Norman of 1977

And so, the McMaster team boldly concluded: ‘Family physicians do have identifiable legitimate problem solving skills which they can teach. We feel that the model outlined above can help student to develop their clinical problem solving skills’.⁶⁷² These are the ideas with which Barrows and Neufeld travelled to Maastricht to act as educational consultants to the new Faculty of Medicine.

Internal debates (1977-1979)

⁶⁶⁹ Howard S. Barrows and Kara Bennett, ‘The diagnostic (problem solving) skill of the neurologist: experimental studies and their implications for neurological training’, *Archives of Neurology* 26 (1972): 273-277.

⁶⁷⁰ Geoffrey Norman, *in correspondence with the author*, November 20, 2015.

⁶⁷¹ J.W. Feightner et al., ‘Solving Problems: How Does the Family Physician Do It?’ *Canadian Family Physician* 23 (1977): 67-71.

⁶⁷² Feightner et al., ‘Solving Problems’, 71

As we have seen, whilst education research played a much larger role at Maastricht than at McMaster, during the years 1974-1977, the research efforts were largely haphazard. Henk Schmidt and Peter Bouhuijs, under the very loose guidance of Wynand Wijnen, attempted to make sense of what mechanisms were at play beneath the practice of PBL. Although they were involved and co-authored some of the publications, Bouhuijs and Wijnen's role in this research was limited, the bulk of the findings coming from Schmidt. There is ample evidence from written correspondence between them that throughout the 1970s and 1980s, Schmidt held both Barrows and Neufeld in very high esteem. In Schmidt's eyes, Barrows was in fact one of the founders of PBL and therefore warranted listening to.⁶⁷³ It is therefore not entirely surprising to find Barrows and Neufeld's model of hypothetico-deduction in Schmidt's early work from 1977. We have also seen that Dick Snow contributed advisory reports to the Dean of the MFM in which he further promoted the information-processing model. Interestingly, he used the early work of Schmidt as a basis onto which he could anchor his own Newell-and-Simon-inspired ideas, seemingly unaware that his young colleague was already heading in an entirely different intellectual direction. How did Schmidt move from one paradigm to the next? A comparison of his two major contributions between 1977 and 1979 may provide answers to this question. In 1977, Schmidt wrote *Probleemgeoriënteerd onderwijs*, a booklet designed to be used internally at the Faculty. In it, he wrote down for the first time his ideas on the cognitive mechanisms underlying learning through PBL.⁶⁷⁴ This manuscript was published one year later in the Dutch journal *Metamedica*,⁶⁷⁵ and one year later re-written in a substantially amended format as *Leren met Problemen*.⁶⁷⁶ The key lies in the changes made between the 1977 paper (and its identical reprint in 1978) and the 1979 paper. The table below indicates the most significant of these changes.

⁶⁷³ Evidenced from a letter that Schmidt sent to Barrows in which he openly shared his admiration. Henk G. Schmidt, 'Letter to H.S. Barrows - 7 January 1983.' Letter from 1983. Erasmus University, Private Collection of HG Schmidt. Rotterdam, The Netherlands.

⁶⁷⁴ Henk G Schmidt, 'Probleemgeoriënteerd onderwijs', Booklet from 1977. Erasmus University, Private Collection of HG Schmidt. Rotterdam, The Netherlands.

⁶⁷⁵ Henk G Schmidt, 'Probleem-georiënteerd onderwijs: leren aan de hand van problemen.' *Metamedica* 1 (1978): 4-15.

⁶⁷⁶ Henk G Schmidt, 'Leren met problemen, een inleiding in probleemgestuurd onderwijs'.in *Handboek voor de onderwijspraktijk* (Deventer: Van Loghum Slaterus, 1979).

Title, Date of Paper	Information Processing Content	Constructivist Content
<i>Probleemgeoriënteerd onderwijs</i> (1977)	<p>(1) Reference to computer-simulations as latest advances in cognitive sciences.</p> <p>(2) Use of Barrows & Tamblyn (1980) model of clinical reasoning with hypothesis generation.</p> <p>(3) Belief that problem-solving is the “transformation of a problem into a solution by <i>hypothesis-testing</i>.”</p> <p>(4) Problem-solving can mean the <i>pathway</i> through which a solution can be brought forward even if the underlying mechanisms are not fully known.</p> <p>(5) Central advantage of PBL is the training of <i>problem-analysis skills</i> & promotion of thinking processes.</p> <p>References: Barrows, Elstein, Shulman</p>	<p>(a) Reading of Elstein (1972) as indicating importance of prior experience for medical problem solving.</p> <p>(b) Recognition that good chess players make poor doctors due to the importance of <i>prior knowledge</i>.</p> <p>(c) PBL is about understanding the <i>underlying mechanisms</i> of phenomena.</p> <p>References: Bruner</p>
<i>Leren met problemen</i> (1979)	<p>(6) Students and doctors generate hypotheses automatically, in the same way. This is not a skill that can trained or improved independently of content.</p> <p>References: Barrows</p>	<p>(d) <i>Activation</i> of prior knowledge: self-study allows students to “fill up” relevant cognitive structures.</p> <p>(e) Internal representation is a construction and interpretation of reality.</p> <p>(f) These constructions are tested against reality, people make theories based on knowledge, test them, then make other theories.</p> <p>References: Ausubel, Bruner, de Groot, Kelly, Miller.</p>

Table 13: Information Processing v. Constructivist Content in Schmidt (1977) and (1979)

We see in the 1977 paper an extensive explanation of PBL in terms of Barrows, Elstein and Shulman’s hypothetico-deductive model, with diagrams that closely resemble those published by Barrows in his own work from 1977. And yet, already in 1977, Schmidt was intrigued by the experiments of Dutch psychologist De Groot on chess players and concluded, as Elstein also did later, that prior knowledge must be a major factor in performance on problem-solving tasks. But these ideas could only be considered hunches at the time: aside from a passing mention of Bruner, Schmidt’s reference list is remarkably devoid of constructivist literature. This was very much amended in the 1979 paper, which is replete with notes on Ausubel, Kelly, De Groot, as well as digressions on Bruner and Miller. Although Schmidt had used the term ‘prior knowledge’ before, this was the first time that he framed it strongly in terms of the ‘activation of prior knowledge’ – and therefore PBL as a learning method that could be used precisely for that purpose. Gone were the references to hypothetico-deduction, absent the diagrams of Barrows – for Schmidt, hypothesis generation was now an automatic process that could not be trained, and there was therefore little point in expending energy researching it.

With this significant shift in research direction, Schmidt no longer aligned his research with that of Barrows from across the proverbial pond. This leads to two important historical

questions: why did Schmidt change research direction in the first place? And would the work of Barrows and Schmidt ever again reconcile?

Popper's definition of what a problem is

What prompted Henk Schmidt to look for an alternative explanation to information-processing theory regarding learning in PBL? Schmidt, by his own admission, had not read Piaget or Vygotsky.⁶⁷⁷ He was heavily inspired by the work of Bruner, but saw the limitations of the relevance of Bruner's theories from the outset. Although he worked on the basis of the theories of accommodation and assimilation, Bruner had very little to say about the role of prior knowledge in problem-solving: the crux of his theory lay more in the necessity of intrinsic motivation and teacher support in education. Based on archival evidence, we can conclude that Schmidt's discovery of Anderson and the later constructivists is a consequence, not a cause of his search for an alternative. In fact, Schmidt himself categorically stated in correspondence that it was his singular appreciation of the work of the Anglo-Austrian philosopher Karl Popper that led him to question the assumptions of Barrows' version of PBL.⁶⁷⁸

In 1973, the year before he joined the Faculty of Medicine in Maastricht, Schmidt wrote his Masters dissertation on the application of Karl Popper's falsification idea in human problem solving. The original manuscript is unfortunately lost, but Schmidt recalls being fascinated by the theory put forward in *Conjectures and Refutations* and *Objective Knowledge*.⁶⁷⁹ Popper is most well-known for his demarcation between science and non-science by the means of 'falsification'. To summarize his proposition, he suggested that since nothing can ever be proven inductively, the best that science can do is to put forward hypotheses and theories and then attempt to falsify them. The best hypotheses are those that are the most resistant to falsification attempts – but they can never be held as eternal truths because the time may always come where their premises will be refuted through falsification. In this sense, scientific truth is always temporal. As an aside, it is interesting to note that theories and statements that cannot be put to the falsification test, such as Marxist analysis and religious doctrine, do not constitute science by Popper's definition. What interested Schmidt in particular in Popper's work was the idea that the basis of scientific conjectures is theory – namely, these conjectures are content-bound: there is no stand-alone process of falsification without contextual and content-bound theories to support it. Popper summarized this idea as follows:

$$P_1 \rightarrow TT \rightarrow EE \rightarrow P_2$$

Here, 'P' stands for 'problem'; 'TT' stands for 'tentative theory'; and 'EE' stands for '(attempted) error elimination', especially by way of critical discussion. My tetradic schema is an attempt to show that the result of criticism, or of error-elimination, applied to a tentative theory, is as a rule the emergence of a new problem (...). I suggest that we can best gauge the progress made by science by the distance in depth and expectedness between P_1 and P_2 .⁶⁸⁰

⁶⁷⁷ Schmidt, in correspondence with the author, July 8. 2015.

⁶⁷⁸ Ibid.

⁶⁷⁹ Karl R. Popper, *Conjectures and refutations, the growth of scientific knowledge* (New York, NY: Routledge, 1963); Karl R. Popper, *Objective knowledge: An evolutionary approach* (Oxford, UK: Oxford University Press, 1972)

⁶⁸⁰ Popper, 'Objective Knowledge', 287.

It is apparent from this excerpt that Popper believed problems to trigger the formation of tentative theories based on a scientist's prior knowledge and experiences explaining the underlying causes of the problem. These theories were then tested for errors and refined in confrontation with reality into better theories. For Schmidt, this meant that the person necessarily had to make use of knowledge to explain the various phenomena at play in the problem, rather than making use of empty problem-solving processes. When Schmidt encountered PBL a year after his Masters thesis, the link became apparent to him:

Based on Popper's ideas I therefore, quite early after 1974, defined a problem for PBL as 'a set of phenomena or events (observed in daily life) that are in need of explanation in terms of underlying principles or mechanisms'. And problem-solving as attempts to understand or explain these phenomena or events. Note that these definitions also opened possibilities for empirical disciplines other than medicine to use problem-based learning: economics, history, physics, etc., which was useful when problem-based schools of law and economics were added to Maastricht University.⁶⁸¹

His last point is crucial, as Maastricht was the first institution to seriously apply the medical model of PBL to disciplines outside of medical education.

Schmidt and Barrows: An historical reconciliation?

Our second historical question was: in the face of the defeat of the information-processing paradigm as an understanding of cognitive psychology, did Barrows and Schmidt reconcile on the interpretation of PBL?

Barrows and Schmidt were in regular contact during the 1980s as consultants from McMaster flew to Maastricht and vice-versa. In particular, in 1983, Schmidt organized a symposium on PBL for which he invited Barrows as a speaker. A series of letter exchanges leading up to this event sheds some light on their academic relationship. For instance, a letter written by Barrows to Schmidt in July 1982 indicates that the former believed PBL to be the acquisition of basic sciences knowledge and 'medical problem solving as a cognitive skill' in equal measure.⁶⁸² In response, Schmidt returned a letter to Barrows in January 1983, in which he voiced in the clearest way possible the rift between their approaches to PBL:

I think that the difference between your work and mine is more a difference of problem-solving in terms of encoding, storage and retrieval of knowledge for use in problem-solving situations (and, most important, in terms of the organization of knowledge in memory), while you focus on the process of problem-solving itself. My main interest lies in the role PBL plays in knowledge acquisition - that is why I refer with emphasis to theories of learning (role of knowledge, inference production, organization of knowledge, retrieval cues etc.) - while you are particularly interested in how the students use the knowledge acquired in clinical problem-solving situations (and therefore refer to theory and research in that area). In fact, I think that our approaches are complementary. We would make a good team! When you are in Maastricht, we certainly should sit down to discuss these matters and others.⁶⁸³

⁶⁸¹ Schmidt, in correspondence with the author, July 8. 2015.

⁶⁸² Howard Barrows, 'Letter to Henk Schmidt.' Letter from 1982. Erasmus University, Private Collection of HG Schmidt. Rotterdam, the Netherlands.

⁶⁸³ Henk G. Schmidt, 'Letter to H.S. Barrows - 7 January 1983.' Letter from 1983. Erasmus University, Private Collection of H.G. Schmidt. Rotterdam.

In fact, it seems that the approaches were not so much complimentary as mutually exclusive as they relied on opposing understandings of the role of knowledge in problem-solving (heuristics and associations v. constructivism). And yet, the two attempted to reconcile their viewpoints during Barrows' visit for the 1983 symposium at the MFM. In his address, Barrows largely dropped the idea of clinical reasoning skills as the primary focus of PBL and instead produced a piece which had strong echoes of constructivist psychology:

Superficially, this process appears to many faculty as if the students are playing doctor. They are learning to work up and diagnose patients but are not really getting down to the important concepts of basic science. This is where the skills of the faculty tutor are very important. Students at any level of medical school enjoy making a diagnosis - but that is not what is going on here. The hypotheses that the students are asked to develop should be those of the underlying basic mechanisms, not diseases.⁶⁸⁴

To support his argument, he cited Schmidt on several occasions. This text stands in contrast to almost everything that Barrows wrote prior to it. It also stands in contradiction to the text that he co-authored with Paul Feltovich for the same conference, in which references to Newell and Simon are rife. The article refers to 'means-end analysis' as a generalizable method of problem-solving (weak method) and conditional methods of problem-solving (strong method) that require specific reasoning processes, rather than content. The vocabulary of the article borrows from Newell and Simon's problem-space and problem-representation, in an attempt to salvage the idea of general problem-solving. But as Barrows was only second author in this paper, this does not constitute evidence of his views.

Schmidt recounts that after the lull of 1983, the dispute picked up again in the late 1980s, culminating in an open confrontation during a review of the PBL curriculum of Sherbrooke University in Canada in 1992:

Howard Barrows, George Bordage, Charles Boelen (of the World Health Organization), and I were invited around 1992 to assess the then five-year old problem-based medical curriculum of the University of Sherbrooke in Canada. I had been one of this school's consultants, had visited many times in the previous years, and had conducted teacher training workshops emphasizing PBL as a method to acquire knowledge and its embedding in cognitive constructivism. Barrows (perhaps not aware of my previous role) was highly critical about what had been accomplished, because the curriculum "was not a problem-solving curriculum." Much more emphasis should be put on students acquiring the process of clinical reasoning, otherwise it was not really problem-based. I felt it necessary to object and eventually ended up in a heated argument with him.⁶⁸⁵

When asked, Georges Bordage and Charles Boelen could not remember the specifics of this particular event, but both agreed that Barrows, on different occasions, 'was not too enthusiastic [about knowledge-based PBL] - too much about knowledge and not enough about the process of clinical reasoning, same issue'.⁶⁸⁶ Boelen recalled:

On another occasion at UNM in Albuquerque, I think in 1993, as we were considering with a dozen of colleagues PBL applied to public health problems, I remember him exposing very strongly the same

⁶⁸⁴ Howard S. Barrows, 'A specific problem-based, self-directed learning method designed to teach medical problem-solving skills, and enhance knowledge retention and recall.' In: *Tutorials in Problem-based Learning: a new direction in teaching the health professions*, ed. Henk G. Schmidt and M.L. de Volder (1st ed. Assen / Maastricht: Van Gorcum, 1984): 16-32.

⁶⁸⁵ Schmidt, *in correspondence with the author*, December 6, 2015.

⁶⁸⁶ Georges Bordage, *in correspondence with the author*, December 7, 2015.

CHAPTER 4: THE MAASTRICHT INTELLECTUAL DEBATE

arguments and the conversation became so heated that our friend Charles Engel who dared to argue was shocked and about to weep.⁶⁸⁷

If any doubt persists within the reader, an analysis of the later works of Barrows clearly show that he espoused information-processing to some degree until the end of his academic career, a claim also confirmed by his former research assistant Norman.⁶⁸⁸ In 1996, Barrows produced a paper summarizing his view of PBL in which he re-iterated the importance of clinical problem-solving skills, but also the importance of the acquisition of a medical knowledge-base that would be integrated, centred around the cues of patient problems, and enmeshed with the problem-solving process.⁶⁸⁹

Until the end, Barrows and Schmidt retained two different understandings of the role of problems in PBL. Whereas Barrows believed that problems should be a ‘patient problem or community health problem’⁶⁹⁰ that implied a problem-management or problem-solving component, Schmidt stated that ‘a problem consists of a description of a set of phenomena or events that can be perceived in reality’ and therefore ‘these phenomena have to be analysed or explained by the tutorial group in terms of underlying principles, mechanisms or processes’.⁶⁹¹ Therefore, whereas a PBL problem for Barrows could be ‘a written case, case vignette, standardized (also called *simulated* patient), computer simulation, video tape’,⁶⁹² for Schmidt, a problem could also look like this:

Een-eiige Tweeling

Jan en Erik, een één-eiige tweeling, verloren op 7-jarig leeftijd bij een auto-ongeval hun beide ouders. Jan is verder opgevoegd in het gezin (3 kinderen) van een los-arbeider. Erik werd opgenomen in het gezin (eveneens 3 kinderen) van een wetenschappelijk medewerker. Op 6-jarige leeftijd waren Jan en Erik psychologisch getest. Jan’s intelligentiequotiënt bleek 111 te zijn, dat van Erik 108. Op 12-jarige leeftijd werden beide jongens opnieuw getest. Jan’s IQ bleek nu 93 te zijn et dat van Erik 123.

Verklaar het verschil in resultaten.

This problem, taken from a booklet illustrating the use of problems at Maastricht, does not require a ‘solution’, or a health care plan.⁶⁹³ It requires instead that the underlying principles

⁶⁸⁷ Charles Boelen, *in correspondence with the author*, December 7, 2015.

⁶⁸⁸ Geoffrey Norman, *in correspondence with the author*, November 20, 2015.

⁶⁸⁹ Howard S. Barrows, ‘Problem-based learning in medicine and beyond: A brief overview.’ *New Directions for Teaching and Learning*, 1996(68)(1996): 3–12.

⁶⁹⁰ Barrows, ‘Problem-based learning in medicine’, 5.

⁶⁹¹ Henk G. Schmidt, ‘Foundations of problem-based learning: some explanatory notes.’ *Medical Education*, 27(5)(1993): 422–432.

⁶⁹² Barrows, ‘Problem-based learning in medicine’, 6.

⁶⁹³ Henk Schmidt and Peter Bouhuijs, ‘Vijfentwintig problemen.’ Booklet from 1981. Erasmus University, Private Collection of H.G. Schmidt. Rotterdam. Translates as:

Identical Twins

Jan and Erik, identical twins, lost their parents at the age of 7 from a car accident. Jan was fostered in the (3 children) family of a contract-labourer. Erik was fostered by the (also 3 children) family of a scientist. At the age

or theory be grasped by the students. While this sort of problem could be and was translated to almost any academic discipline, problems based on the management of healthcare problems could not be. Perhaps this serves to explain the profusion of PBL programmes in the Netherlands in all manner of academic disciplines. As concerns Maastricht, the conclusion on problem-solving *versus* problem understanding was shapely drawn by Wynand Wijnen in 1990:

Of studenten in een bepaalde fase van de studie de juiste oplossing hebben weten te vinden bij het aangereikte probleem is eigenlijk van ondergeschikt belang. Belangrijk is wel, dat het probleem voldoende aanknopingspunten biedt voor een variatie aan studieactiviteiten. [...] Probleemsturing is dan ook niet gelijk te stellen met probleemoplossen.⁶⁹⁴

Even though this debate was settled at Maastricht, it remains a major source of debate in PBL education and research around the world. As reported by Schmidt and colleagues, there are still many PBL curricula that follow the information-processing approach to PBL.⁶⁹⁵ In these curricula, PBL is still seen as a method for developing problem-solving skills rather than as a vehicle for understanding the underlying principles or mechanisms that produce these phenomena. These two interpretations are at such odds with one another that calling both of them ‘problem-based learning’ tends to void PBL of its psychological and philosophical underpinnings and may leave only a methodological shell behind, devoid of theoretical support. From a historical perspective, declaring a victor in the dispute for the interpretation of PBL is a difficult matter. In terms of scientific consensus, the constructivist Maastricht interpretation of PBL, as the more theoretically-grounded approach can be awarded a clear academic victory: information-processing has largely been erased from the cognitive psychology of learning, reasoning and problem-solving. But in terms of educational practice, educators from all over the world continue to preach the teaching of general problem-solving skills, so the turf-war for the interpretation of PBL is far from over. Whilst as a historian, one would not purport to prescribe the application of historical lessons to the present day, one may very well encourage present day educators to seriously and extensively question the rationale behind their PBL curriculum: is it primarily grounded in information-processing or in constructivism, and is there a full and open understanding of the educational consequences that this implies?

Conclusion

Following from the historical analysis of the last four chapters, it is fair to conclude that we cannot speak historically of a problem-based model, but of problem-based models in plural

of 6, both Jan and Erik were psychologically evaluated. Jan’s IQ was measured as 111, that of Erik was 108. At the age of 12, both boys were evaluated again. Jan’s IQ was now 93, and that of Erik 123.

Explain the difference in the results.

⁶⁹⁴ Extract from a text by Wijnand Wijnen written as a post-script to: Werkgroep PGO, ‘Probleem Gestuurd Onderwijs’. Translates as: It is not so important that students find a specific solution to a problem in a specific phase of their studies but it’s more important that they get multiple clues for their study activities from the problem. PBL is not the same as problem solving.

⁶⁹⁵ Schmidt et al. ‘Constructivist, Problem-Based Learning Does Work’.

form. Certainly, a layman observer sitting in a classroom in McMaster or in Maastricht in 1977 might not note any significant difference: a small group of students, under the guidance of their tutor, would be discussing a problem before formulating learning objectives. These students would then go to the library to study the scientific literature pertaining to their learning issues, and reconvene in class a few days later to elaborate on their findings. In that sense, the definition provided by Schmidt and colleagues in 2009 holds true for both the McMaster and the Maastricht curricula.⁶⁹⁶ However, beneath apparent similarities in practice and purpose, we have identified deep differences in underlying philosophy and form. These differences run so deep that they went largely unnoticed for many years, and contributors from both models of PBL claimed the word problem-based learning as their own, unaware of the rift between them. It is my experience, having visited PBL-practicing institutions across the globe, that most educational institutions that use the method are profoundly unaware of its intellectual history beyond loose references to Dewey and Bruner. The purpose of this treatise thus far has been therefore to reconstruct this intellectual history in all of its richness and depth and bring to light intellectual debates that cannot be ignored when schools make the choice to use PBL, such as the debate between behaviourism and humanist psychology in the 1960s at McMaster, and the debate between information-processing and constructivist psychology at Maastricht in the 1970s. As historians, we can only unearth, reconstruct and offer our interpretation of history, what happens after that is in the hands of educators. If these educators are not aware of the epistemological implications of their choices, PBL becomes at best a gimmick to satisfy the thirst for ‘twenty-first century skills’ training of accreditation bodies, at worst becomes a tangled web of contradictory education philosophies that only serve to aggravate confused faculty and students.

The picture is complicated enough as regards western medical education, but PBL has since branched out into a myriad of disciplines and countries. So-called ‘hybrid’ curricula have sprouted across the world, to the point where few people in these programmes actually know what PBL stands for, in anything.⁶⁹⁷ In addition, programmes that promoted project-based, problem-oriented models of education since the 1970s in Denmark have claimed the term problem-based learning as their own since the 1990s, and developed their model in partnership with schools in South America and Asia, further adding to the confusion. Today, PBL in all its forms can be found in disciplines as remote from medical education as Liberal Arts, Sociology, Law and Polytechnic Education. In the final part of this treatise, I shall therefore firstly address the Danish claim that project work can be assimilated under the umbrella of PBL from a historical, philosophical and organizational perspective, and so doing illustrate the problem of defining the boundaries of PBL. We shall also, in a final chapter, move away from a purely historical perspective and offer a philosophical and normative evaluation of PBL and its future through a critique of the existentialist ideal of self-directed learning.

⁶⁹⁶ The full list of the six characteristics was explained in the introduction of this treatise. Esther Chng, Elaine HJ Yew, and Henk G Schmidt, ‘Effects of Tutor-Related Behaviours on the Process of Problem-Based Learning’, *Advances in Health Sciences Education* 16, no. 4 (2011): 491–503.

⁶⁹⁷ See for instance the critique of the term ‘hybrid’ made in Chui Yin Kwan and Leslie Tam, ‘Hybrid PBL-What is in a Name?’ *Journal of Medical Education* 13, no. 3 (2009): 76–82.

Part 2: References

Journals & Books

- Anderson, Richard. 'The Notion of Schemata and the Educational Enterprise: General Discussion of the Conference.' In: *Schooling and the Acquisition of Knowledge*. Edited by Richard Anderson, Rand Spiro and William Montague, 415-431, 1st ed. Hillsdale, NJ: Lawrence Erlbaum Associates, 1977.
- Anderson, Richard C, and , James W. Pichert. 'Recall of previously unrecalable information following a shift in perspective.' *Journal of Verbal Learning and Verbal Behavior* 17 (1978): 1-12.
- Anderson, Richard C, Rand J. Spiro and Mark C. Anderson, 'Schemata as scaffolding for the representation of information in connected discourse.' *American Educational Research Journal* 15, no. 3 (1978): 433-440.
- Anderson, William A. and Illene B. Harris. 'Arthur S. Elstein, Ph. D.: Skeptic, Scholar, Teacher and Mentor.' *Advances in Health Sciences Education* 8 (2003): 173-182.
- Basisfilosofie Achtste Medische Faculteit. *Medische Contact* 27 (1972): 879-84.
- Barrows, Howard S. (1984). 'A specific problem-based, self-directed learning method designed to teach medical problem-solving skills, and enhance knowledge retention and recall.' In: *Tutorials in Problem-based Learning: a new direction in teaching the health professions*, 1st ed.. Edited by Henk G. Schmidt, and M.L. de Volder, 16-32. Assen / Maastricht, Netherlands: Van Gorcum, 1984.
- Barrows, Howard S. 'Problem-based learning in medicine and beyond: A brief overview.' *New Directions for Teaching and Learning*, 1996, no. 68 (1996): 3-12.
- Barrows, Howard S. and Kara K. Bennett. 'The diagnostic (problem solving) skill of the neurologist : experimental studies and their implications for neurological training.' *Archives of Neurology* 26 (1972): 273-277.
- Barrows, Howard S. and Robyn M. Tamblyn. *Problem-based learning*. New York: Springer Pub. Co., 1980.
- Bechtel, William, Adele Abrahamsen and George Graham. 'Cognitive Science, History'. *International Encyclopedia of the Social and Behavioral Sciences*. 2154-2158, Oxford: Elsevier Science, 2001.
- Berlyne, Daniel E. 'A Theory of Human Curiosity.' *British Journal of Psychology*. 45, no. 3 (1954): 180-191.
- Berlyne, Daniel E. 'Uncertainty and Epistemic Curiosity.' *British Journal of Psychology* 53, no. 1 (1962): 27-34.
- Berlyne, Daniel E. 'Curiosity and learning.' *Motivation and Emotion* 2, no. 2 (1978): 97-175.
- Bruner, Jerome S, Jane Goodnow and George Austin. *A study of thinking*. New York: Wiley, 1956.
- Bruner, Jerome S. *The process of education*. Cambridge, MA: Harvard University Press, 1960.
- Bruner, Jerome S. 'The act of discovery.' *Harvard educational review* 31 (1961): 21-32.
- Bruner, Jerome S. *Toward a theory of instruction*. Cambridge, MA: Belknap Press of Harvard University, 1966.
- Chomsky, Noam. 'Three models for the description of language.' *Information Theory, IRE Transactions on* 2, no. 3 (1956): 113-124.
- Elstein, Arthur, Lee Shulman and Sarah Sprafka. *Medical problem solving*. Cambridge, MA: Harvard University Press, 1978.
- Feightner, J.W., Howard Barrows, Victor R. Neufeld and Geoffrey R. Norman (1977). 'Solving Problems: How Does the Family Physician Do It?' *Canadian Family Physician* 23(1977): 67-71.
- Hamilton, John D. 'The McMaster Curriculum: A Critique' *The British Medical Journal* 1, no. 6019 (1976): 1-7.
- Hergenhahn, Baldwin R. *An introduction to the history of psychology*, 4th ed. Belmont, CA: Wadsworth Pub. Co, 2001.
- Knegtman, Peter J. *De Medische Faculteit Maastricht: een nieuwe universiteit in een herstructureringsgebied, 1969-1984* (The Medical Faculty Maastricht: a new university in an era of restructuring). Assen: Van Gorcum, 1992.
- Konečni, Vladimir J. 'Daniel E. Berlyne (1924-1976): Two Decades Later.' *Empirical Studies of the Arts* 14, no. 2 (1996): 129-142.
- Kwan, Chui-Yin and Leslie Tam. 'Hybrid PBL-What is in a Name?' *Journal of Medical Education* 13, no. 3 (2009): 76-82.
- MacDonald, Peter J, P.J. Chong, Pisonthi Chongtrakul, Victor R. Neufeld, Peter Tugwell, Larry W. Chambers, R.J. Pickering and Mary Jane Oates. 'Setting educational priorities for learning the concepts of population health'. *Medical Education* 23 (1989): 429-439.
- McGuire, Christine H. 'Medical Problem-Solving: a critique of the literature'. *Journal of Medical Education* 60 (1985): 587-595.
- Miller, George A. 'The cognitive revolution: a historical perspective.' *Trends in Cognitive Sciences* 7, no. 3 (2003): 141-144.

CHAPTER 4: THE MAASTRICHT INTELLECTUAL DEBATE

- Muijtjens, Arno M.M., Lambert W.T. Schuwirth, Janke Cohen-Schotanus, Arnold Thoben, and Cees P.M. van der Vleuten. 'Benchmarking by cross-institutional comparison of student achievement in a progress test.' *Medical Education* 42, no. 1 (2007): 82–88.
- Neufeld, Victor R. and Howard S. Barrows. 'The "McMaster Philosophy": An Approach to Medical Education.' *Journal of Medical Education* 49 (1974) 1040–1050.
- Neville, Alan J. and Geoffrey R. Norman. 'PBL in the undergraduate MD program at McMaster University: three iterations in three decades.' *Academic Medicine*, 82, no. 4 (2004): 370–374.
- Newell, Alan, Herbert Simon and J.C. Shaw. 'Elements of a Theory of Human Problem Solving.' *Psychological Review*, 65, no. 3 (1958): 151–166.
- Newell, Alan and Herbert Simon. *Human problem solving*. Englewood Cliffs, NJ: Prentice-Hall, 1972.
- Norman, Geoffrey R., Alan J. Neville, Jennifer M. Blake and C. Barber Mueller. 'Assessment steers learning down the right road: Impact of progress testing on licensing examination performance.' *Medical Teacher* 32, no. 6 (2010): 496–499.
- Michel-Alder, E. 'Nicht die Krankheit steht im Zentrum - sondern die ihrer Gesundheit gestörte Person' (The diseases not at the centre – but the health of the patient) *Tages Anzeiger Magazin*, 46 (1977): 34.
- Ohlsson, Stellan. 'The Problems with Problem Solving: Reflections on the Rise, Current Status, and Possible Future of a Cognitive Research Paradigm.' *The Journal of Problem Solving* 5, no. 1 (2012): 101–128.
- Piaget, Jean. *The Psychology of Intelligence (Routledge Classics)* 2nd ed. Kindle edition. Routledge, 2003.
- Piaget, Jean. *The origins of intelligence in children* (Vol. 8). New York: International Universities Press, 1952.
- Piaget, Jean. *The language and thought of the child* (Vol. 5). Psychology Press, 1959.
- de Pinho, Luis Antonio, Fábio Batista Mota, Mariza Velloso Fernandez Conde, Luiz Anastácio Alves, and Renato Matos Lopes. 'Mapping Knowledge Produced on Problem-Based Learning Between 1945 and 2014: a Bibliometric Analysis.' *Creative Education* 6, no. 6 (2015): 576–84.
- Popper, Karl R. *Conjectures and refutations, the growth of scientific knowledge*. New York, NY: Routledge, 1963.
- Popper, Karl R. *Objective knowledge: An evolutionary approach*. Oxford, UK: Oxford University Press, 1972.
- Rotgans, Jerome I. and Henk G. Schmidt. 'Situational interest and learning: Thirst for knowledge'. *Learning and Instruction* 32 (2014), 37-50.
- Schmidt, Henk G. 'Probleem-georiënteerd onderwijs: leren aan de hand van problemen.' (Problem-oriented learning: learning with problems) *Metamedica* 57, no. 1 (1978): 4-16.
- Schmidt, Henk G. 'Leren met problemen, een inleiding in probleemgestuurd onderwijs' (Learning with problems, an introduction to problem-based learning). In: *Handboek voor de onderwijspraktijk*, Deventer, Netherlands: Van Loghum Slaterus, 1979.
- Schmidt, Henk G. *Activatie van voorkennis, intrinsieke motivatie en de verwerking van tekst* (Activation of prior knowledge, intrinsic motivation and the processing of text). Apeldoorn, Netherlands: Van Walraven, 1982.
- Schmidt, Henk G. 'Intrinsieke motivatie en studieprestatie: enkele verkennende onderzoeken' (Intrinsic motivation and achievement: some investigations). *Pedagogische Studiën* 60 (1983): 385-395.
- Schmidt, Henk G. 'Problem-Based Learning: Rationale and Description.' *Medical Education* 17 (1983): 11–16.
- Schmidt, Henk G. 'Foundations of problem-based learning: some explanatory notes.' *Medical Education* 27, no. 5 (1993): 422–432.
- Schmidt, Henk G. 'Professor dr. Wynand Wijnen (1934-2012).' *Pedagogische Studiën* 90, no. 1 (2013): 5-7.
- Schmidt, Henk G. and Peter A.J. Bouhuijs. *Onderwijs in taakgerichte groepen* (Education in task-oriented groups). Utrecht, Netherlands: Spectrum, 1980.
- Schmidt, Henk G, Henk T. van der Molen, Wilco W.R. Te Winkel and Wynand Wijnen. 'Constructivist, Problem-Based Learning Does Work: A Meta-Analysis of Curricular Comparisons Involving a Single Medical School.' *Educational Psychologist* 44, no. 4 (2009): 227–249.
- Spaulding, William B. *Revitalizing Medical Education, McMaster Medical School the Early Years 1965-1974*. Hamilton, ON: B.C. Decker Inc, 1991.
- Simon, Herbert A. *Allen Newell 1927-1992*, 141–173 (Washington DC: National Academies Press, 1997). Accessed November 15, 2015. <http://www.nasonline.org/publications/biographical-memoirs/memoir-pdfs/newell-allen.pdf>
- Tiddens, Harmannus A.W.M. *Het renale syndroom van De Toni met dwerggroei. Proefschrift*. Amsterdam, Netherlands: Diligentia, 1957.
- Thorndike, Edward L. 'Animal intelligence: An experimental study of the associative processes in animals.' *Psychological Monographs: General and Applied* 2, no. 4 (1898), i-109.
- Van der Vleuten, Cees, Maarten G. Verwijnen, and Wynand Wijnen. 'Fifteen years of experience with progress testing in a problem-based learning curriculum.' *Medical Teacher* 19, no. 2 (1996): 103-109.
- Vygotsky, Lev S. *Thought and Language*. Translated by Alexander Kozulin, Cambridge, MA: The MIT Press, 1986.

REVOLUTIONS & RE-ITERATIONS

Wood, David J, Jerome S. Bruner and Gail Ross. 'The role of tutoring in problem solving.' *Journal of Child Psychiatry and Psychology* 17, no. 2 (1976): 89-100.

Archive Material

- Ali, Mohammed. 'To: M.D. Education Committee.' Letter from January 7, 1977. Educational Programme Committee - 1977/1978 - HHS/ FHS Archives, Box 233.2;1. McMaster University, Hamilton, Ontario
- Barrows, Howard. 'Specific Description of the Tutor Role'. OC 75-125 Memorandum from 1975. Rijksarchief in Limburg, 07.C06 - Inventaris 90. Maastricht.
- Barrows, H. 'Letter to Henk Schmidt.' Letter from 1982. Erasmus University, Private Collection of H.G. Schmidt. Rotterdam.
- Bartholomeus, Pie. 'Het Skillslab in de Komende Jaren' (The Skillslab in coming years), OC 77-069 Memorandum from 1977. Rijksarchief in Limburg, 07.C06 - inventaris 94. Maastricht.
- Bell, Norman. 'Review of on-going group program, M.F.M, 1974-75.' OC 75-019 Report from 1975. Rijksarchief in Limburg, 07.C06 - inventaris 90. Maastricht.
- Bongaerts, Fons. 'Aan de leden van de onderwijscommissie' (To the members of the Education Commission). OC 76-098 Letter from March 29, 1976. Rijksarchief in Limburg, 07.C06 - inventaris 90. Maastricht.
- Bouhuijs, Peter, Joost Bremer, Job Metsemakers, Henk Schmidt, and Ger van der Vusse. 'Het tutorsysteem' (The Tutor System). Guide book from 1977. Erasmus University, Private Collection of HG Schmidt. Rotterdam.
- Bouhuijs, Peter and Henk Schmidt. 'Effekten van taakverdeling binnen onderwijsgroepen op leerresultaat en satisfactie bij studenten' (Effects of task division on study results and student satisfaction in education groups) Research report from 1977. Erasmus University, Private Collection of HG Schmidt. Rotterdam.
- Hulsmans, R. and M. Mommers. 'Letter to the Education Commission'. OC 75-096 Letter from April 25, 1975. Rijksarchief in Limburg, 07.C06. Maastricht.
- McAuley, Ron. 'MD Education Programme - Current Status and Proposed Plans for Areas Requiring Attention in the Coming Year. - September 12, 1977.' Report from 1977. Educational Programme Committee - 1977/1978 - HHS/ FHS Archives, Box 233.2;3. McMaster University, Hamilton, Ontario.
- Neufeld, Victor. 'Ref: Proposed terms of reference for MD Program Task force on Objectives - To: Ron McAuley.' Letter from February 8, 1977. Educational Programme Committee - 1977/1978 - HHS/ FHS Archives, Box 233.2;1. McMaster University, Hamilton, Ontario.
- 'Objectives of the M.D. Programme (Revised).' Memorandum from 1978. McMaster University, Educational Programme Committee - 1977/1978 - HHS/ FHS Archives, Box 233.2;4. Hamilton, Ontario.
- 'Onderwijsconferentie 7-3-1977' (Education conference 7-3-1977). OC 79-239 Proceedings from 1977. Rijksarchief in Limburg, 07.C06 - inventaris 94. Maastricht.
- Pasmans, P, M. Debije, D. Bremer, Fons Bongaerts, and K. van Vugt. 'Voorstellen aan de Onderwijscommissie inzake het beleid t.a.v. onderwijsgroepen' (Proposals to the education commission regarding the policies on education groups). OC 76-097 Memorandum from 1976. Rijksarchief in Limburg, 07.C06 - inventaris 90. Maastricht.
- Projektgroep tutorsysteem, 'Letter to the chairman of the department of the faculty of medicine RL.' Letter from 1979. Erasmus University, Private Collection of HG Schmidt. Rotterdam.
- Reerink, Evert. 'Opmerkingen gemaakt tijdens een bezoek van 1 dag aan McMaster, Ontario, Canada, 22-5-1975' (Remarks made during a visit of one day to McMaster, Ontario, Canada). OC 75-124 Report from 1975. Rijksarchief in Limburg, 07.C06 - Inventaris 90. Maastricht.
- 'Resultaten van de Programa Evaluatie van het Studiejaar 1976-1977' (Programme evaluation of the study year 1976-1977) OC 77-289. Report from 1977. Rijksarchief in Limburg, 07.C06 - inventaris 95. Maastricht.
- Roomans, Fons. 'Letter to Prof. Dr. Norman Bell - 19 February 1975.' OC 75-024. Letter from 1975. Rijksarchief in Limburg, 07.C06 - inventaris 90. Maastricht.
- Roy, W. 'Exit Survey Report - Class of 1977.' Report from 1978. McMaster University, Educational Programme Committee - 1977/1978 - HHS/ FHS, Archives Box 233.2;4. Hamilton, Ontario.
- Schmidt, Henk. 'Rapportage van de projectgroep Tutortraining' (Report of the project group tutor training). OC 76-192. Report from 1976. Erasmus University, Private Collection of H.G. Schmidt. Rotterdam.
- Schmidt, Henk. 'Voorstel tot het opstarten van een projekt "tutorsysteem". Kursus Probleemgeoriënteerd Onderwijs' (Proposal for the launch of a project 'Tutor System'. Course in problem-oriented education). OC 78-116. Booklet from 1977. Rijksarchief in Limburg, 07.C06 - Inventaris 98. Maastricht.
- Schmidt, Henk. 'Hoofdprojekt onderzoek van onderwijs'(Main Project Research on Education) OC 77-249. Memorandum from 1977. Rijksarchief in Limburg, inventaris 95. Maastricht.
- Schmidt, Henk. 'Probleemgeoriënteerd onderwijs' (Problem-oriented education). Booklet from 1977. Erasmus University, Private Collection H.G. Schmidt. Rotterdam.

CHAPTER 4: THE MAASTRICHT INTELLECTUAL DEBATE

- Schmidt, Henk. 'Tutortraining - De Taken van de Tutor' (Tutor training – the tasks of the tutor). OC 77-164 Memorandum from 1977. Rijksarchief in Limburg, 07-C06 - inventaris 98. Maastricht.
- Schmidt, Henk. 'Letter to the members of the Onderwijscommissie and the portefeuillehouder Onderwijs in the Faculty Board.' OC 78-080 Letter from 1978. Rijksarchief in Limburg, 07.C06 - Inventaris 96. Maastricht
- Schmidt, Henk and Peter Bouhuijs. 'Vijfentwintig problemen' (Twenty-five problems) Booklet from 1981. Erasmus University, Private Collection of H.G. Schmidt. Rotterdam.
- Schmidt, Henk 'Letter to H.S. Barrows.' Letter from January 7, 1983. Erasmus University, Private Collection of H.G. Schmidt. Rotterdam.
- Schmidt, Henk 'Symposium on Problem-Based Learning - Program, May 25-27, 1983 - Maastricht, The Netherlands.' Conference Programme from 1983. Erasmus University, Private Collection of HG Schmidt. Rotterdam.
- Schmidt, Henk and Peter Bouhuijs. 'Effekten van structurering van patientenproblemen op leerresultaat en satisfactie bij studenten' (Effects of structuring patient problems on study results and student satisfaction). Research report from 1977. Erasmus University, Private Collection of HG Schmidt. Rotterdam.
- Schmidt, Henk and Peter Bouhuijs, P. 'Het Tutorensysteem (2e Druk)' (The Tutor System, 2nd Edition). Report from 1977. Erasmus University, Private Collection of HG Schmidt. Rotterdam.
- Schmidt, Henk, Gerard Majoor and Wynand Wijnen. 'Introduction to the medical study'. Booklet from 1979. Erasmus University, Private Collection H.G. Schmidt. Rotterdam.
- 'Screeningstoets d.d. 11 Maart 1977' (Progress Test of 11 March 1977). OC 77-062 Examination from 1977. Rijksarchief in Limburg, 07.C06 - inventaris 94. Maastricht.
- Snow, Richard. 'To: Harmen Tiddens, Wynand Wijnen - 17 March 1977.' Report from 1977. Erasmus University, Private Collection of H.G. Schmidt. Rotterdam.
- Sutton, John. 'To: Dr. G.S. Cameron - November 15, 1977.' Letter from 1977. McMaster University, Educational Programme Committee - 1977/1978 - HHS/FHS Archives, Box 233.2;3. Hamilton, Ontario.
- Unknown. 'Phase I: 1970, Guidelines to Operating the Programme.' Memorandum from 1970. Educational Programme Committee - 1970 - HHS / FHS Archives, Box 232.5;8. McMaster University, Hamilton, Ontario
- van Bommel, Lex. 'Bijlage advies van de subcie "evaluatie en planning trainingsgroepen" aan de onderwijscommissie' (Appendix advice to the education commission of the sub-commission 'evaluation and planning training groups'). OC 75-097. Memorandum from 1975. Rijksarchief in Limburg, 07.C06 - inventaris 90. Maastricht.
- Verstappen, Frans. 'Letter to H. Schmidt & P. Bouhuijs - 18 April 1977.' Letter from 1977. Erasmus University, Private Collection H.G. Schmidt. Rotterdam.
- Werkgroep PGO, 'Probleem Gestuurd Onderwijs - Eindrapport van een werkgroep Rijksuniversiteit Limburg' (Problem-based learning – End Report of a working party from the State University of Limburg). Report from 1990. Erasmus University, Private Collection H.G. Schmidt. Rotterdam.
- Wijnen, Wynand. 'Onderwijseenheid I: Inleiding tot de Medische Studie. Verslag van de koordinator.' OC 75-055. Report from 1975. Rijksarchief in Limburg, 07.C06 - inventaris 90. Maastricht.
- Wijnen, Wynand. 'Evaluatie van Studieresultaten' (Evaluation of Study Results) OC 76-059 Report from 1976. Rijksarchief in Limburg, 07.C06 - inventaris 90. Maastricht.
- Wijnen, Wynand. 'Konkretisering Evaluatievoorstel' (Concretisation of Evaluation Proposal). OC 76-100. Memorandum from 1976. Rijksarchief in Limburg, 07.C06 - inventaris 90. Maastricht.
- Wijnen, Wynand. 'Enkele notities ter gedachtebepaling bij de discussie over de "her"structurering van het curriculum a.s. woensdag 22 mrt 1978' (Some notes on thoughts regarding the discussion on 'restructuring of the curriculum' of Wednesday 22nd March 1978). Draft paper from 1978. Erasmus University, Private Collection of HG Schmidt. Rotterdam.
- Wijnen, Wynand. (1976). 'Voorstellen betreffende Evaluatie' (Proposal regarding Evaluation). OC 76-011. Memorandum from 1976. Rijksarchief in Limburg, 07.C06. Maastricht.
- Wijnen, Wynand and Henk Schmidt. 'Problem-based learning at the Medical Faculty in Maastricht, the Netherlands.' Undated report. Erasmus University, Private Collection H.G. Schmidt. Rotterdam.
- Willighagen, Roelof and Henk Schmidt. 'Voorstel tot opbouw van een (zoveel mogelijk) geïntegreerd 1e studiejaar 1975-1976' (Proposal for the build-up of an (as far as possible) integrated 1st year of study 1975-1976). OC 75-115 Memorandum from 1974. Rijksarchief in Limburg, 07.C06 - Inventaris 89. Maastricht.

Online References

REVOLUTIONS & RE-ITERATIONS

- 'H. Tiddens (1923-2002) - Vernieuwend Professor.' NRC Handelsblad. Accessed April 15, 2015, <http://www.tiddens.xenat.nl/harmen-tiddens/>
- 'Jerome S. Bruner'. Encyclopædia Britannica Online. Accessed October 14, 2015, <http://www.britannica.com/biography/Jerome-S-Bruner>
- Bruner, Jerome S. 'Celebrating Divergence: Piaget and Vygotsky.' In *Proceedings of Growing Mind Conference, 15 September 1996, Geneva*, 122-145. Accessed November 15, 2015, <http://www2.winchester.ac.uk/edstudies/arch12-13/level%20two%20sem%20one/es2212w11%20br1.pdf>
- van der Vleuten, Cees and Henk van Berkel. 'Wynand Wijnen (1934-2012) - een man van betekenis.' Professioneel Begeleiden. Accessed June 1, 2015, <https://www.professioneelbegeleiden.nl/wynand-wijnen-1934-2012-een-man-van-betekenis>
- Stasz, Cathleen and Christian van Stolk. 'The Use of Lottery Systems in School Admissions.' (WR-460-SUT: RAND Europe, 2007). Accessed June 9, 2015. [http://www.rand.org/content/dam/rand/pubs/working_papers/2007/RAND WR460.pdf](http://www.rand.org/content/dam/rand/pubs/working_papers/2007/RAND_WR460.pdf)

PART 3

In Search of the 'Heart' of PBL

A debate on the principles underlying PBL

And the historical relevance of Project Work therein

In the first two parts of this treatise, we have explored the beginnings of problem-based learning by looking at the historical development of the first two PBL programmes in McMaster and Maastricht between 1963 and 1985. Although these were the first two programmes to label themselves as PBL, other universities were beginning to work with their own interpretations of problem-orientation in education around the same time period. Indeed, the concept of using problems as the starting point of learning was also adopted by so-called ‘reformed’ universities in Germany and Denmark in the early 1970s. Broadly speaking, these universities in Bremen, Roskilde and Aalborg integrated societal problems in interdisciplinary project-based curricula in almost all academic disciplines. Interestingly, Aalborg University, founded in 1974 in the Danish province of Northern Jutland, began referring to itself as a ‘problem-based learning’ university in the 1990s, whereas the two others did not. This was the first explicit attempt at bridging the educational divide between the historic models of PBL and the type of problem-oriented education that had sprung in the form of project-based curricula. Aalborg University has gone on to wield a large influence in the global problem-based learning community, particularly thanks to its partnerships with UNESCO. This begs the historical question: to what extent could the Aalborg curriculum and its project-based, problem-oriented model of higher education be considered an iteration of problem-based learning? This in turn forces us to reflect on what the core principles defining PBL might be.

This may seem like an academic exercise of little interest to the real world of educators but in fact it is a debate crucial to the survival of the method. What makes ‘problem-based learning’ just that? If programmes that differ to such a large extent can all fall under the same label, why not accept each and all that wish to be called thus under the label of PBL? And so we see a plethora of so-called ‘PBL’ programmes appear all over the World, which, under closer inspections, merely borrow this or that element from PBL - perhaps a case here, and a skills lab there - but offer none of the spirit in which PBL was incepted. Thus, for example, we find in South East Asia many programmes that involve one or two problems scattered throughout the semester in addition to the regular fully fledged lecture-based and teacher-driven courses. The sole objective of these token problems appears to be promoting collaboration skills and complying with accreditation requirements from skills-hungry ministries.⁶⁹⁸ These so-called ‘hybrid’ PBL programmes have often been delivered in bad faith and speedily reverted to the old ways.⁶⁹⁹ But even when those that implemented the changes did so in good faith, they often lacked understanding of the purpose and scientific underpinnings of the method. How is one to criticize this haphazard approach, when the problem-based method itself was born of specific historical instances and morphed into as many iterations as there were programmes along the way? Is there even such a thing as a ‘heart of PBL’, without falling into the trappings of messianic dogmatism, as derided by Kinsey Smith in 1980 when he jokingly wrote:

Then in the fullness of time the divine rulers of our school saw fit to increase the number [of students] to 40. Still, they were able to go through the Phase in the same way as the first group, but of course, there were concerns that famine might appear in the land because there did not appear to be enough resources to go around for a larger group of students continuing to go through the programme consecutively. After a

⁶⁹⁸ South East Asia is merely an example familiar to the author but this is a world-wide phenomenon.

⁶⁹⁹ Chiu-Yin Kwan, and Leslie Tam. ‘Hybrid PBL-What Is in a Name?’ *Journal of Medical Education* 13, no. 3 (2009): 76–82.

number of prayers for manna to be sent from on high, it became clear that the preservation of the philosophy that makes this school different from all others demanded some re-arrangements of the units in Phase III.⁷⁰⁰

This tongue-and-cheek passage might as well have been written in 2016, as many educators continue to treat PBL as a miracle cure to all educational ills - enraging those who firmly believe in traditional ways and pitting one against the other in a battle of wills over reason. The only way out of this dispute is to lay down a new, reasoned, argued, historically grounded but presently relevant philosophy of PBL, that steers clear of blind devotion to any particular educational method and instead finds its support in evidence and argument.

The two chapters of this final part of the treatise will propose to do just that. Firstly, the next chapter will look at the Danish model of PBL, its historical origins and intellectual background in Roskilde and its re-interpretation in Aalborg. Then, we shall suggest that although the models are historically separate from the McMaster and Maastricht iterations of PBL, an argument for joining the two models on the basis of common intellectual inspirations in constructivist psychology and objectives could be made. However, we shall conclude that taking a purely psychological perspective would reduce PBL to an educational gimmick devoid of the transformative ambitions that were so present in all of the intellectual inspirations that brought it into being, from Comenius to Rogers. The treatise will therefore conclude from a different perspective: by arguing that self-direction and its philosophical implications form the core of PBL, and should be the benchmark by which PBL programmes are evaluated.

⁷⁰⁰ Kinsey Smith, 'Why Make A Change In Phase III?' Essay addressed to the Education Committee from 10th November 1980. Educational Programme Committee - 1980 - HHS / FHS Archives: Box 233.3;4. McMaster University, Hamilton, ON.

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The case of Denmark poses an interesting conundrum for anybody attempting to sketch a history of PBL: the history of the Danish model begins in Copenhagen with the turbulences of the student revolts of 1968, steeped in Marxist critique of bourgeois education and ends somewhere in the 1990s with the rise to global attention of an engineering programme in Aalborg, 300 kilometres away, that called its education method ‘problem-based learning’ with explicit references to the McMaster and Maastricht models of PBL.⁷⁰¹ How did the former lead to the latter? In other words: was the bridging of the Danish model with PBL an after-thought attempt to hook Aalborg’s programme to an existing internationally recognized education method, or was there, from the start, a real overlap of educational principles and philosophy in the model? Anette Kolmos, one of the key proponents of the Aalborg model, stated during her interview that the decision to name their education system PBL was driven by the ‘common learning principles from the learning theories’ behind the medical and Danish iterations of problem-orientated education.⁷⁰² In this chapter, we shall attempt to unearth the founding principles of the Danish model and to compare them with the principles of the McMaster and Maastricht models of PBL. To do so, we will first set the scene with a brief history of the Danish reform, and then deal with the historical questions that arise: namely, we will compare the nature of problems in the different models, then look at the similarities and differences in the nature of the educational process, before determining whether Kolmos was indeed correct that common learning principles can be derived from Danish project work and medical PBL. Finally, we will conclude on whether this constitutes sufficient grounds for assimilating the two models.

The Danish story begins in Copenhagen in the late 1960s – discontentment had been brewing on the benches of Denmark’s oldest higher education institution. The generation of post-war students was larger and less inclined to abide by the laws of tradition than any Denmark had ever dealt with before. Copenhagen University was bursting, unable to accommodate the increasing demand for higher education. At the same time, students rejected the traditional professorial model and demanded more influence on their own education. One former student at Copenhagen University recalled this time vividly:

As far as I remember, it started at [...] the psychology programme: the students there asked to get more influence on the content in the study programme. They said it was out-dated, rather old fashioned, [...] useless knowledge, most of it. So they tried to get into a dialogue with the professors; the university was run solely by professors at that time, [...] they had something called a *Konsistorium*, which was formed by professors of university. So other teachers, lower than professors, students, technical staff, administrative staff, none of them were involved in steering committees and votes and things like that. So what the students at psychology wanted was to have influence on the study programme, on the content of the programme. So they wanted to have study boards with partly teachers and partly students negotiating about

⁷⁰¹ For instance, references to McMaster and Maastricht can be found in connection to the Aalborg model in Anette Kolmos, Flemming K. Fink and Lone Krogh, ‘The Aalborg Model – Problem and Project Based Learning’ in *The Aalborg PBL Model: progress, diversity and challenges*, edited by Anette Kolmos, Flemming K. Fink and Lone Krogh (Aalborg: Aalborg University Press, 2004), 11.

⁷⁰² Anette Kolmos, (former student of social sciences at Aalborg University Centre, UNESCO Chair for PBL in Engineering Education) in interview with the author, at Aalborg University, January 14, 2013.

what should be the content of the programme. And as a result of that they occupied, they blocked the institute, the department. And threw out the professors, and blocked it with tables and furniture and things like that. And that was really the start of the student revolt in Denmark, in Copenhagen in 1968.⁷⁰³

In answer to this pressure, a specially appointed committee of the Danish Ministry of Education recommended the establishment a new type of university, so-called ‘University Centres’ that grouped together types of higher education that had hitherto been hosted by separate institutions and would provide students with a common interdisciplinary basic education from which they could specialise further on in their studies.⁷⁰⁴ This resulted in the Danish Parliament approving the establishment of Roskilde University, 30 kilometres outside of Copenhagen – a new University Centre to open in 1972 under the banner of a new, more democratic, more modern way of delivering education.

In summary, the core of this new type of education was its problem-orientation, interdisciplinarity and student-directedness, expressed as project work. Key features of the model included allocating responsibility for problem-formulation jointly between students and teachers rather than teachers alone (as was the case at McMaster and Maastricht). Secondly, projects were usually developed over the course of several months rather than the short problem-cycles of one to two weeks seen in medicine. Thirdly, although this was not the original intention, a 50/50 split between project work and traditional courses quickly became the norm. Although initially half of traditional courses were specifically geared towards the projects, nowadays the full share of traditional courses is independent of the projects.

The following sections will retrace the origins and development of the project-based model at Roskilde from 1970 to 1980, then follow its evolution at Aalborg university until the adoption of the PBL terminology by Aalborg in the 1990s. Then we shall proceed to comparing key aspects of educational practice in the McMaster and Maastricht models and in the Roskilde and Aalborg models. Finally, we shall close on a reflection on the ‘heart’ on PBL, moving us into chapter 6.

Roskilde University Centre

The Danish historian Else Hansen wrote a comprehensive history of RUC in *En Koral i Tidens Strøm* (a Coral in the Flow of Time), from which we shall derive much of our account, cross-referenced with interviews with key participants and archive materials.⁷⁰⁵ The short time span between the passing of the law and the opening date set for Roskilde University Centre (RUC) led to something of a mad scramble to assemble various committees tasked with establishing the principles of the forthcoming institution, in which students, professors and politicians alike

⁷⁰³ Thomas Werner, (former student of Copenhagen University during the student revolt) in interview with the author, at Erasmus University, Rotterdam, August 30, 2013.

⁷⁰⁴ Niels Hastrup, unpublished report from 1974. ‘The Making Of Roskilde University-Centre: Background, Principles And Problems’, RU-History Collection, Mag RHS a 353, Roskilde University Library, Roskilde University.

⁷⁰⁵ Else Hansen. *En Koral I Tidens Strøm*. [A Coral in the Current of Time] (Frederiksberg: Roskilde Universitetsforlag, 1997). This book has not been translated into English – my own translation comes from a joint study of the book with Rune Larsen from the History Department of Roskilde University in July 2014.

had a say. Arguably the strongest force in the shaping of the reformed education model was the *Danske studerendes fællesråd* (Danish Student Union; DSF) who were at the time a major political player nation-wide and enjoyed strong support from the Social-Democrats in parliament. The DSF appointed several of its members to take part in the discussions surrounding the new university, most prominent among which Henning Salling Olesen and Børge Klemmensen. According to Hansen, the DSF presented an educational wish-list for the new university in 1970, which was to Roskilde what Evans' memorandum of 1966 was to McMaster. The list cited the following ideas:

- Problemorientering skal gøre den tværfaglige sammenhæng reel, idet forskellige synsvinkler skal bruges på det samme emne
- Projekter (case-studies) skal udgøre grundstammen i basisuddannelsen. De gamle discipliners teorier og metoder bliver hjælpefag. Hvis en teori gennemgås i sammenhæng, skal det være styret af de studerendes problemformulering
- Selvstyre: de studerende vælger selv de problemer, de vil arbejde med, men indenfor bestemte emneområder
- Grupper: arbejdet skal foregå i tilfældigt sammensatte grupper (for at undgå opdeling efter politisk tilhørsforhold), her kan der ske en direkte konfrontation af forskellige synspunkter og deraf følgende værdibevidsthed og samarbejdsstræning
- Lærernes funktion skal bestå i at give bistand til problemløsningen
- Ingen eksamen: af hensyn til selvstyret skal der helst ikke være eksamen eller anden kontrol, men det er nok ikke realistisk af hensyn til det videre studieforløb og for at få erhvervskompetence
- Samfundsmæssig betydning: ansvaret for at vælge selv skal give de studerendestørre engagement i de emner som undersøges. Resultaterne af deres arbejde kan måske ændre på de undersøgte forhold, bruges udenfor universitetet, og dermed have samfundsmæssig betydning.⁷⁰⁶

Figure 8: The Educational Principles of RUC according to the DSF - 1970

Armed with these principles, RUC set about developing a unique programme where learning was centred around three core ideals: self/participant direction (student autonomy), problem-orientation and interdisciplinarity – Olesen described the rationale for these three pillars of RUC education as follows:

⁷⁰⁶ Hansen, *En Koral I Tidens Strøm*, 43. Translates as:

1. Problem-orientation shall make the interdisciplinary connection real, since different points of view must be applied to the same topic.
2. Projects (case-studies) shall constitute the rootstock in the basic education. The theories and methods of the old disciplines become auxiliary courses. If a theory is reviewed in connection, it must be guided by the student's problem definition.
3. Self-direction: the students choose the problems they want to work with themselves, but within certain subject areas.
4. Groups: the work must be done in randomly established groups (to avoid division according to political affiliation); where a direct confrontation of differing points of views can happen with a subsequent value-consciousness and cooperation-training.
5. The teacher's function is to support the problem-solving.
6. No exam: for the sake of the self-direction there should preferably be no examination or other types of control, but that's probably not realistic for the sake of the further course of study and to get vocational competence
7. Social significance: the responsibility to make their own decisions should engage the students more in the topics investigated. The results of their work may change the matters under investigation, be used outside the university and thus have social significance.

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These were the three didactic or organizational principles: student autonomy, right to define their own study orientation and content; problem-orientation, which was defining the curriculum not by disciplines, sub-disciplines, but by issues, problems that should be pursued; interdisciplinarity, which was getting rid of disciplinary boundaries. And the project work was, so to say, the practical implementation of these principles. By organizing collective project work, students were allowed to define their study interests, [...] and they were not limited by disciplinary curricula.⁷⁰⁷

The result was a curriculum in which every student entering the university would go through two years of broad interdisciplinary education with a focus in either humanities, social sciences or natural sciences (so-called *basisuddannelse*, or Basic Education), and then specialise in the remaining three years of their education. The *basisuddannelse* had three peculiarities: the study was organized around project-work, the students worked in so-called 'Houses', and the examinations were a joint effort done in project groups.

The definition of what constituted a project was left rather vague. The DSF wish-list seemed to equate projects with case-studies, but this comparison did not feature in any other university documents. In a book from 1977, three authors from Roskilde explained project work as follows:

Projektarbejde vil vi her definere som en undervisningsform, hvor elever – i samarbejde med lærere og evt. Andre – udforsker og behandler et problem i nær relation til den samfundsmæssige virkelighed, det forekommer i. Dette indebærer, at arbejdet skal give stadig øget perspektiv og dyberegående erkendelse, at problemet angribes fra en række forskellige synsvinkler på tværs af traditionelle faggrænser, og at valget af teorier, metoder og redskaber styres, ud fra det valgte problem. ... Arbejdet skal munde ud i et konkret produkt, der kan være en mundtlig fremlæggelse, en skriftlig rapport, eller udtrykt i andre medier eller handlinger.⁷⁰⁸

According to this definition then, a project would be nothing more and nothing less than the investigation of a problem leading to some tangible end-product. The founding report on humanities was even more non-specific, arguing that *basisuddannelse* should be conceived of as a project whose detailed shape could be changed 'dynamically' in relation to 'the purpose to further individuals and group possibilities to shape their own life'.⁷⁰⁹ In this sense, project work was more of a vision on social transformation than a specific education method. The vague nature of this definition allowed for a great breadth of interpretation, giving the method a very wide scope but also murkier the waters when it comes to analysing it. It seems, from archival evidence, that projects were the result of a semester-long group effort (usually 6-8 students) to dig deep into a socially relevant problem of the group's choosing, usually based

⁷⁰⁷ Henning Salling Olesen, (*former DSF representative at RUC*) in interview with the author, at Roskilde University, January 4, 2013.

⁷⁰⁸ Jens Berthelsen, Knud Illeris, and Sted Clod Poulsen, *Projektarbejde: erfaringer og praktisk vejledning*. (Holstebro: Borgen, 1977), 14-15. Translates as: Project-work we will here define as a teaching approach, where pupils – in collaboration with teachers and possibly others – investigate and handle a problem in near relation with the community reality within which it appears. This means: that the work should lead to continuous increased perspective and deeper insight; that the problem is approached from a variety of points of view across traditional disciplinary boundaries, and that the choice of theories, methods and tools are guided by the selected problem. ... The work will result in a tangible product which can be an oral presentation, a written report, or expressed by other media or actions.

⁷⁰⁹ Interimstudienævnet for det humanistiske hovedområde, 'Betænkning Om Den Humanistiske Basisuddannelse' [Report on Humanities Basic Education]. Report from 1972, RU-History Collection Mag RHS a 145, Roskilde University Library, Roskilde, chapter 2.

on a list of themes devised by the faculty. The process of choosing a problem for the project was described as follows by Karin Beyer, a natural sciences lecturer at RUC in 1976, who described suitable problems as interdisciplinary real world situations that had to be understood in their social context.⁷¹⁰ We shall go into the nature of problems in the project model in depth at a later stage in this chapter. Suffice to note for the present that the breadth of interpretation of ‘problems’ suitable for this model of education was far greater than was imaginable at McMaster or Maastricht. One can imagine the sort of directions that one could venture into with problem statement as open as ‘on workplace accidents’.⁷¹¹ Ideally, the students would have classes to support their project work when needed, but they would be required to research the relevant theories to deal with their chosen problem themselves, with the support of a *vejleder* (literally: way-leader; supervisor) from the faculty. The implication was that projects should constitute a reflection between theory and practice – or *praxis*.⁷¹²

The ‘house’ model was a new physical organization system for studies, whereby students would be provided with a working space under their own collective management, kitted out with group rooms and dining areas, inspired by anglo-saxon colleges but non-residential.⁷¹³

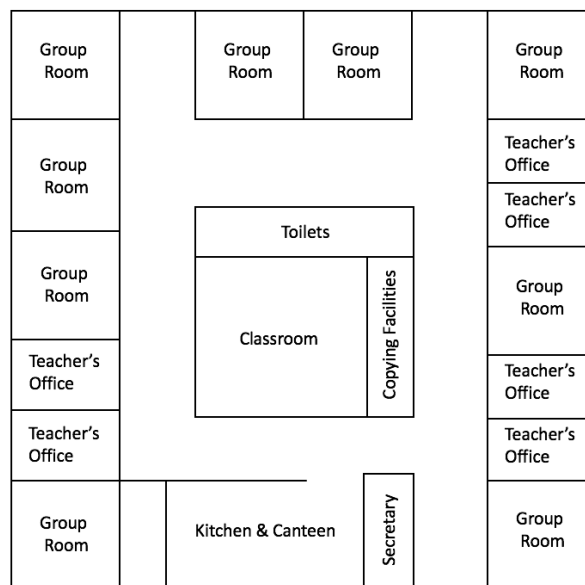


Figure 9: A Typical 'House' at RUC

⁷¹⁰ Karin Beyer. 'On The Development Of The Idea Of Project-Organization At The Natural Science Basic Studies Course, RUC', Conference paper from 1976, RU-History Collection Mag RHS a 104. Roskilde University Library, Roskilde.

⁷¹¹ Project title from Social Sciences, 1975. 'Noget om arbejdsulykker', Roskilde University, accessed May 18, 2016, https://safir.ruc.dk/sites/rap/pub/search.html?doaction=showfull&data=keyno_list=x25105934xformat=pub-full language=da

⁷¹² As stated in the founding documents for humanities and social sciences: Interimstudienævnet for det humanistiske hovedområde, 'Betænkning Om Den Humanistiske Basisuddannelse' [Report on Humanities Basic Education]. Report from 1972, RU-History Collection Mag RHS a 145, Roskilde University Library, Roskilde; Roskilde Universitetscenter, 'Betænkning Om Samfundsvidenskabelig Basisuddannelse' [Report on Social Sciences Basic Education]. Report from 1972. Roskilde, Denmark. RU-History Collection Mag RHS a 183. Roskilde University Library, Roskilde.

⁷¹³ Schematic extracted from Knud Illeris, 'The Organization of studies at Roskilde University, the concept, practice and problems of project organization' *CRE-Seminar 19th – 24th June* (1992), 19.

Niels Haastrup, one of the inceptors of the humanities programme at RUC, described the houses thus:

Each house has 63 students, 5 teachers, representing different subjects of study, and a secretary. The houses are physically separated from each other. There is a working day at the house just as at other places of work. The day is not over when the lectures are finished because there aren't any. The management of the house is an internal affair, one vote per person and absolute democracy. Matters of more general inter-house interest are handled by democratically elected committees on which teaching and administrative staff have relatively more to say than students.⁷¹⁴

Although the original DSF wish-list proposed to do away with examinations, they immediately qualified that statement with the recognition that examinations were still the benchmark by which future employees would be judged. Instead, a compromise was reached whereby examinations would take place within the project group – meaning the entire group would be awarded a mark collectively.⁷¹⁵ This was something of a small revolution in its own right, and one that conservative governments have seemingly been at war with ever since.⁷¹⁶

The principles and their applications described here constitute the ideals upon which Roskilde was founded in the democratic optimism of 1970. In practice the model and its defenders waged a continuous war against the government throughout the 1970s for the safeguard of these principles. By the end of the conflicts in the 1980s, some elements of the model were salvaged, others were not. But to understand the conflicts that shaped problem-orientation at RUC, and why so much was changed at Aalborg, it is important to first understand the theoretical backdrop against which these ideas were developed.

Frankfurt School Marxist Intellectual Foundations

To try to understand the birth of Danish problem-oriented education without looking at the influence of the Frankfurt School would be like trying to understand the French revolution without looking at the enlightenment: there were certainly other factors involved, but the so-called 'positivist critique' is an inescapable focal point when it comes to the intellectual backdrop of the Roskilde project.

The Frankfurt School was a Marxist-Freudian school of thought born in 1929 at the *Institut für Sozialforschung* (Institute for Social Research) in Frankfurt am Main, which witnessed its most prominent developments after the Second World War.⁷¹⁷ It was a loose association of philosophers joined together in a critique of positivism, capitalism and Soviet socialism, led by

⁷¹⁴ Haastrup, 'Report from 1974', 10.

⁷¹⁵ As described by Børge Klemmensen, 'Sølvbryllup I oprøret, - og ligusterhæk ensretning og ukritisk tilpassethed hos afkommet' [The silver anniversary of rebellion – and privet hedges, regimentation and uncritical conformity in the offspring], in *RUC i 25 År* [RUC is 25 years old], ed. Henrik Toft Jensen, (Frederiksberg: Roskilde Universitetsforlag, 1997), 39.

⁷¹⁶ Jette E. Holgaard, and Anette Kolmos. 'Group Or Individual Assessment In Engineering, Science And Health Education'. In *Research On PBL Practice In Engineering Education*, 1st ed., ed. Xiangyun Du, Erik de Graaff and Anette Kolmos (Rotterdam: Sense Publishers, 2009), 57-70.

⁷¹⁷ J.C. Berendzen. 'Max Horkheimer'. *Stanford Encyclopedia of Philosophy*. Last modified July 31, 2013. <http://plato.stanford.edu/entries/horkheimer/>. See also: James Bohman. 'Critical Theory'. *Stanford Encyclopedia of Philosophy*. Last modified Spring 2015. <http://plato.stanford.edu/entries/critical-theory/>.

Max Horkheimer, Theodor Adorno, Herbert Marcuse and later, Jürgen Habermas.⁷¹⁸ These philosophers complemented classical Marxism with inspiration from Hegel and Freud in particular, spawning a ‘psycho-social’ critique of positivism, hence the term ‘Critical School’ which is often used interchangeably with ‘Frankfurt School’. According to Horkheimer, the aim of the Critical School was to ‘emancipate humans from slavery’ while creating a ‘world which satisfies the needs and powers’ of humans.⁷¹⁹ In this description, we see the typical marriage of Marxist and Hegelian ideas made by the school.

Frankfurt School thinking birthed a sub-branch of critical philosophy, which called itself *Kritische Erziehungswissenschaft* (Critical Pedagogy).⁷²⁰ This later addition to the family of critical philosophy schools was brought about by and enmeshed in the student revolts of the 1960s during which educationists began to demand that out-dated educational-theoretical positions be overturned. The first Critical Pedagogy thinkers were Herwig Blankertz, Wolfgang Klafki and Klaus Mollenhauer, later followed by Oskar Negt and his occasional collaborator the German cineaste Alexander Kluge. The principles of the Critical Pedagogy movement were laid out by Blankertz as follows:

Ist nun Erziehung [...] ein gesellschaftliches Phänomen, so hat Pädagogik als Theorie ihr erkenntnisleidendes Interesse in Mündigkeit und Emanzipation. Eine so verstandene Theorie gewinnt die Maßstäbe der Kritik durch ihr Interesse an der Aufhebung von Verdinglichung und Selbstentfremdung des Menschen. Die kritische Aufhebung ist nur dort möglich, wo die intellektuelle Potenz der Gesellschaft befreit werden kann zu ihrer wahren Möglichkeit und Bildung.⁷²¹

In essence, critical pedagogy concerned itself with the historical-societal structure of education, meaning that education could not be separated from society but instead was embedded in a web of political power and hegemony conflicts. Like all critical theories, it proposed a dialectic understanding of pedagogy, pitting working class education against the interests of the ruling class.⁷²²

In 1968, Oskar Negt, a then-relatively unknown student of Adorno, published a critical pedagogy book that would profoundly impact the history of Roskilde University: *Soziologische Phantasie und Exemplarishes Lernen* (Sociological Imagination and Exemplary Learning).⁷²³

⁷¹⁸ See Peter Thompson’s series on the Frankfurt School in *The Guardian*: Peter Thompson, ‘The Frankfurt School, Part 3: Dialectic Of Enlightenment’. *The Guardian*, Published 8 April 2013. <http://www.theguardian.com/commentisfree/2013/apr/08/frankfurt-school-dialectic-of-enlightenment?INTCMP=sfl>.

⁷¹⁹ As cited by Bohman, ‘Critical Theory’.

⁷²⁰ Bernhard Koring, ‘Konzepte der Erziehungswissenschaft’ [The concept of critical pedagogy]. *TU Chemnitz-Zwickau*. Last modified April 6, 1997. <http://neibecker.wiwi.uni-karlsruhe.de/breiter/fertig/chemnitz/homesem.htm>

⁷²¹ Herwig Blankertz, ‘Pädagogische Theorie und empirische Forschung’ [Pedagogical theory and empirical research], 1966, as cited by Fey, Carl-Christian. *Kostenfrei Online-Lehrmittel*. (Bad Heilbrunn: Julius Klinkhardt, 2015), 80. Translates as: ‘If education is a societal phenomenon, so pedagogy as a theory has its knowledge oriented interest in maturity and emancipation. A theory thus understood would have an interest in the dissolution of the objectification and self-alienation of the human. This critical is possible everywhere where the intellectual power of society can be freed towards its true capability through enlightenment and education.’

⁷²² I am grateful to my research assistant Rebecca Paul at Erasmus University College for her translations of original German texts leading to this description.

⁷²³ Oskar Negt, *Soziologische Phantasie und Exemplarishes Lernen: Zur Theorie und Praxis der Arbeiterbildung* [Sociological Imagination and Exemplary Learning: Toward a Theory and Practice of Worker’s Education],

The central argument of this text was that working class children suffered insuperable *Sprachbarrieren* (language barriers) that alienated them from bourgeois education systems and led them to fail in a school system literally shaped linguistically for and by the ruling class. The cause of these *Sprachbarrieren* lay in the bourgeois-capitalist vocabulary's failure to capture the workers' lived experiences. Thus, Negt concluded, the following must be the tenets of a good working class education:

Da es sich meist um traditionell überlieferte und verdinglichte Deutungsmodelle handelt, müßte eine kritische Bildungsarbeit darin bestehen, durch soziologische Lernprozessen neu auftretende Widersprüche zwischen dem sozialen Selbstverständnis des einzelnen, den *existierenden* Formen des Klassenbewußtseins und den veränderten Existenzbedingungen bewußt zu machen und auf eine sozialrevolutionäre Praxis hin zu orientieren.⁷²⁴

How should education promote these forms of self-understanding and conscientization? Inspired by Wright Mill's 'Sociological Imagination', Negt answered with the concept of *exemplarisches Lernen* (learning based on examples, often translated as 'exemplarity' or 'exemplary learning'): learning had to centre on problems relevant to the everyday experience of workers that could exemplify broader theoretical principles. The pedagogical application of this principle at Roskilde was recently summarised by Andersen and Kjeldsen, who described it as 'a method of reducing curricula without missing important learning outcomes', inspired by Wagenschein 'who stressed how the principle would support the learners' comprehension of broader contexts'.⁷²⁵

In a sense, it was the inductive reversal of *praxis*; rather than moving from theory to practice, workers would move from experience to theory. The centring of education on societal problems led Negt to publish a harsh critique of traditional disciplinary education in his 1972 collaboration with Kluge. In this work, he denounced the division of academia into distinct disciplinary *Fach* (subjects) as inaccessible to the working class because of the disciplines' foundations in bourgeois language that does not have any representation in the workers' experience:

A production of knowledge that is directed in such a way can only compile specialized knowledge and cannot organize the experience of society as a whole. The modes of expression of this specialized knowledge as well as its content can thus not be adopted by the majority of the population. This does not have to do with the extreme limits of academic speech or with the 'backwardness' of the experience of the people; the very coexistence of the proletarian production of experience and that of scientific and scholarly knowledge is based on their diverse material foundations.⁷²⁶

(Frankfurt am Main: Europäische Verslagsanstalt, 1971). This book was never translated into English, I am grateful for the translation assistance of my research assistant Isabella Hoesch at Erasmus University College.

⁷²⁴ *Ibid*, 64-65. Translates as: 'A good educational project consists in sociological learning processes informed by recent debates in self-understanding and existing class consciousness in the context of ever-changing conditions of existence of consciousness, oriented towards social-revolutionary praxis.'

⁷²⁵ Anders Siig Andersen and Tinne Hoff Kjeldsen, 'A Critical Review of the Key Concepts in PPL'. In *The Roskilde Model: Problem- Oriented Learning and Project Work*. ed. Anders Siig Andersen and Simon B. Heilesen (Switzerland: Springer, 2015), 25.

⁷²⁶ Oskar Negt and Alexander Kluge. *Public Sphere and Experience: towards an Analysis of the Bourgeois and Proletarian Public Sphere*. Trans. Peter Labanyi, Jamie Owen Daniel and Assenka Oksinoff. (Minneapolis, MN: University of Minesota Press, 1993), 26.

Thus, universities could be considered as institutions in the service of the production of elite specialized knowledge that alienated the majority of the population. It was this very idea that translated at Roskilde University as *Fagkritik* (critique of the disciplines). This was the basis on which the idea of interdisciplinary projects, particularly in the social sciences, was founded. Salling Olesen recalls the fight between those who wanted to maintain the old structures and those who supported the critical pedagogical standpoint:

In Social Sciences, there was a big discussion between what you could call a conception of an additive basic study, where you say: ‘you need one good course of economics, one good course of political science, one good course of sociology, one good course of statistics... when you have this, then you can continue’, and the more radical rethinking of social science into critical social science in the mode of the Frankfurt School’s influence and in the mode of Social Activism. So, to think Project Work as a format in which you produce resources for social activism and in which you produce holistic critical analysis of contemporary society.⁷²⁷

From this perspective, it is possible to argue that there was more to Roskilde’s project work than a mere pragmatic restructuring of education to accommodate large numbers of students. The extent of the influence of Frankfurt School ideas can be debated, but there is little doubt that Roskilde was imbued with political undertones that were totally lacking from McMaster and Maastricht.

This leaves us with a rather puzzling question: how did a critical intellectual movement from Germany become relevant to a nascent Danish university? Klemmensen, who was the interim board student representative at RUC from 1970-72 and a close friend of its first Rector Erling Olsen, recalled the following:

Fagkritikken, der var ‘the buzz word’ for 68-oprørets faglige sider, havde både en ekstern dimension og en interne dimension. Den eksterne fagkritik gik på videnskaben og dermed studiernes samfundsmæssige rolle. Det var her, det politiske opgør med de herskende tilstande blev formuleret. Et i denne sammenhæng både markant og fyndigt udtryk for kernen i kritikken mod de herskende tilstande var slagordet fra besættelsen af Københavns Universitet i marts 1970: ‘Forskning for Folket – ikke for Profitten’. [...] Fagkritikkens interne side rettede sig mod fagets teoretiske og metodisk grundlag og trossætninger. Det var i denne sammenhæng, det faglige opgør udspandt sig.⁷²⁸

So it was that the radical view of the academic world inspired by Oskar Negt and the Critical Pedagogy movement made its way into the planning of RUC via the DSF and its representatives, in particular Salling Olesen and Klemmensen, but also a large contingent of young radical teachers and students from the social sciences and to some extent from the humanities.

⁷²⁷ Salling Olesen, in interview with the author, January 4, 2013.

⁷²⁸ Klemmensen, ‘Sølvbryllup I oprøret’, 42-43. Translates as: ‘Fagkritik was the buzz-word of the 1968 insurgency and had both an internal and external component. The external fagkritik was about science and the societal role of studies. Here, the political confrontation against prevailing conditions was formulated. The catchphrase from the occupation of Copenhagen University in March 1970 distinctively and succinctly expresses the core of this criticism: ‘research for the people, not for profits’. [...] The fagkritik’s internal aspect was directed at the discipline’s theoretical and methodological foundations and beliefs. It was in this context that the academic showdown ensued.’

Having shown the Frankfurt School influence in the establishment of RUC, it is fair to ask whether this influence was counterbalanced by other theories or approaches. In fact, just like at Maastricht, constructivist psychology played an important role in rescuing RUC from the political dangers of perceived Marxist-alignment in the middle of the Cold War. There were at RUC two other groups of students and faculty who contributed to the setup of the RUC problem-oriented model. They were inspired by the somewhat less politically revolutionary but nonetheless educationally alternative views of Dewey, Piaget, Rogers and Bruner – all of which we have encountered before in this treatise, whether connected to McMaster or Maastricht. The supporters of Dewey and his younger student-cum-intellectual-rival William Kilpatrick were mostly to be found in teacher education, whereas, unsurprisingly, the Piaget-aficionados were to be found in the department of psychology at RUC.

The influence of progressive pedagogy: Dewey v. Kilpatrick

The history of teacher training in Denmark is particularly tied to the project method, both in its historical sense and in the sense adopted later by RUC. Historically, the Teacher Training College of Copenhagen was very much in line with the ideas of Dewey. As RUC's most prominent education scholar Knud Illeris stated:

Oskar Negt was completely unknown to the teacher training people. They had their references in the history of pedagogy and if any person should be mentioned indeed, it's Dewey. [...] He had a younger partner called Kilpatrick [who] made the first description of problem orientation.⁷²⁹

These ideas were brought to the table at RUC by one of the professors of the Teacher Training College, Jens Bjerg. Bjerg, a school teacher from Esbjerg turned psychologist and education researcher, formed part of a small group of teachers from the College who initiated an interdisciplinary, group-work based programme called 'Development Work and Projects'. This programme merged pedagogy, 'didactics' and psychology in the form of community-based research projects.⁷³⁰ Bjerg was brought in to help with the setup of Roskilde University in 1971, and was appointed Professor there once the University opened. He was not much engaged with the management of the university beyond the initial years, but his ideas on project work lived on through the writings of Illeris, who was then his student and about which more shall be said in the next section. Although some faculty members from the Frankfurt School tradition like Salling Olesen dispute the historical importance of progressive pedagogy ideas at RUC,⁷³¹ the ideas of Dewey and Kilpatrick on project-work continue to be cited by Roskilde as the theoretical foundations of project work, as for example in Andersen and Kjeldsen, and must therefore be taken seriously as a source of inspiration.⁷³²

⁷²⁹ Knud Illeris (*education theorist at RUC, author of Problemorientering og deltagerstyring*) in interview with the author, at Danmarks Pædagogiske Universitet Copenhagen, August 21, 2013.

⁷³⁰ Ibid.

⁷³¹ Henning Salling Olesen, *personal communication*, 18 December 2015.

⁷³² Anders Siig Andersen and Tinne Hoff Kjeldsen, 'Theoretical Foundations of PPL at Roskilde University'. In *The Roskilde Model: Problem- Oriented Learning and Project Work*. ed. Anders Siig Andersen and Simon B. Heilesen (Switzerland: Springer, 2015), 13.

One should be careful not to amalgamate Dewey and Kilpatrick, though: far from being partners, the two scholars were at intellectual loggerheads from 1918 onwards. Dewey, as we have seen, posited that true learning can only take place when the object to be learned constitutes a genuine problem to the learner, which is anchored in his personal experience – and therefore becomes the subject of his curiosity. Education thus became, for Dewey, the lifelong reorganization and reconstruction of experience, driven by a quest for meaning. For Dewey, however, this organization of learning around experience could not be idiosyncratic but had instead to order itself around the social context in which the learner was situated. Thus, education had to shape the growth of the student in a direction that fitted within the shared meaning of the good as defined by the society in which it evolved. From these ideas, the so-called ‘problem-method’ was derived by contemporaries of Dewey such as Frank McMurry. We have seen in the first part of this book how the problem-method, via the Harvard Case Method, influenced McMaster’s PBL model.

With regards to his conception of education methods, Dewey differed markedly from his younger student and later rival William Kilpatrick. Kilpatrick was an unusual gentleman; his educational story began at Columbia University in 1907, where he met his teacher and later colleague Dewey, but also the likes of Edward Thorndike and Frederick Woodbridge. By 1912, Kilpatrick had obtained his doctoral degree from the prestigious institution, and was promoted to assistant and then associate professor. Education historian Michael Knoll remarked of Kilpatrick:

In 1915, Kilpatrick was in his mid-forties and, according to his own statement, one of the most popular faculty members at the College. Impatiently, he was awaiting promotion to full professor, but his ambition far exceeded the acquisition of academic positions. He wanted, as he confided to his diary on 1 January 1917, to achieve ‘power and influence’ and to go down in the annals of the history of education as an ‘original thinker’, not merely as an ‘acceptable teacher’.⁷³³

To make his mark, the ambitious philosopher published in 1918 the piece that would be the most intimately associated with his name thereafter: ‘The Project Method: The Use of the Purposeful Act in the Educative Process’.⁷³⁴ Kilpatrick was not the first to suggest the use of projects in education – they had been used already for some time in agricultural college and architecture studies, and Knoll even dates their use back to the Renaissance Academies of Art in Rome and Paris.⁷³⁵ However, Kilpatrick’s interpretation of what might constitute a ‘project’ was novel, and set him in opposition to Dewey for the rest of his career. Indeed, for Kilpatrick a project was not so much a specific educational how-to, but more of an ‘attitude’ on part of the learner. The project was nothing more and nothing less than ‘a wholehearted purposeful activity proceeding in a social environment’.⁷³⁶ The reader will not be the first to be puzzled by this interpretation – indeed contemporaries of Kilpatrick lambasted his work for sowing

⁷³³ Michael Knoll, ‘A Marriage on the Rocks: An Unknown Letter by William H. Kilpatrick about His Project Method’, *Online Submission* (2010) <http://eric.ed.gov/?id=ED511129>

⁷³⁴ William H. Kilpatrick, ‘The Project Method: The Use of the Purposeful Act in the Educative Process’, *Teachers College Record* 19, no. 4 (1918): 319-335.

⁷³⁵ Michael Knoll, ‘The Project Method: Its Vocational Education Origin and International Development’, *Journal of Industrial Teacher Education* 34, no. 3 (1997), <http://scholar.lib.vt.edu/ejournals/JITE/v34n3/Knoll.html?re>

⁷³⁶ Kilpatrick, ‘The Project Method’, 1.

confusion into what had previously been a well-defined vocational education method.⁷³⁷ Essentially, in Kilpatrick's world-view, direction, whether from the educational system or the teachers themselves, constituted an undesirable influence, an evil to be tolerated where necessary and eliminated where possible to set free the natural potential of the student: 'the teacher's success—if we believe in democracy—will consist in gradually eliminating himself or herself from the success of the procedure'.⁷³⁸ Kilpatrick expressed his mistrust of Dewey's problem-method, fearing that it would overemphasize the teacher's role steer towards ordinary classroom work. Instead, he claimed, projects should be geared towards the social activities possible in the student's attempt to embody a plan or idea in an external form.⁷³⁹ This 'free' view of education was heavily criticized by Dewey, who found it necessary to republish his 1910 *How we Think* in 1933 to address his discontentment with Kilpatrick's views (although he never mentioned the latter by name). Knoll indicates that Kilpatrick regretted the haste with which he proclaimed the end of the teaching profession in his later life, but these ideas on student-direction were imprinted and forever instilled in the project-method.⁷⁴⁰

This brief overview of the differing conceptions of education from the point of view of the problem-method and the project-method leaves us with a puzzle: since Dewey and Kilpatrick's views were opposed, but both get referred to with regards to project-work, which of the two was actually most reflected in the RUC curriculum? If we look at publications theorizing the project work at RUC between 1972 and 1980, we can see for instance that while Dewey featured to some extent in *Problemorientering og deltagerstyring* (Problem-orientation and participant direction) from 1974,⁷⁴¹ neither Dewey nor Kilpatrick appear in *Projektarbejde* (Project Work) from 1977.⁷⁴² When asked for clarifications, it seems, according to Illeris, that very few people were aware of the intellectual dispute between the two philosophers:

In Denmark and especially in progressive Danish pedagogy and schooling Dewey has been very well known and popular ever since the 1930s, whereas Kilpatrick has only been known among a narrow group of experts, and their common superior progressive approach has been more exposed than the differences between them.⁷⁴³

It would be historically unfair then to claim that Kilpatrick had any influence on the RUC curriculum. However, we may ask whether the RUC curriculum in practice resembled more a Deweyan or a Kilpatrick approach to problem-orientation. To do this, we must look at the actual practice of project work, and particularly the role assigned to teachers. The founding documents of RUC seem to imply a very restricted role of teachers, far from the Socratic 'intellectual leader' and content expert envisaged by Dewey.⁷⁴⁴ For instance, the 1972 'Report

⁷³⁷ Knoll. 'A Marriage on the Rocks', 1.

⁷³⁸ Kilpatrick, 'The Project Method', 7.

⁷³⁹ Kilpatrick, 'The Project Method', 9.

⁷⁴⁰ Knoll. 'A Marriage on the Rocks', 6-7.

⁷⁴¹ Knud Illeris, *Problemorientering og deltagerstyring: oploæg til en alternativ didaktik* [Problem-orientation and participant direction: presentation of an alternative didactic] 1st ed., (Copenhagen: Munksgaard, 1974): 171-172. This book was never translated into English, I am grateful to Alfred Birkegaard Hansted from the Department of Philosophy of Roskilde University for his assistance in reading through and translating the relevant passages.

⁷⁴² Berthelsen, Illeris, and Poulsen, *Projektarbejde*.

⁷⁴³ Illeris, *in correspondence with the author*, December 16, 2015.

⁷⁴⁴ John Dewey, *How we Think*. (Lexington MA: D.C. Heath and Company, 1933), 274.

on Social Sciences Education' claimed that teachers should merely act as consultants for project groups, invited in at the request of the students who should determine the course of their own actions.⁷⁴⁵ Berthelsen, Illeris and Clod Poulsen wrote in 1977 that the teacher should help to organize the external environment and confront students with the overall objectives,⁷⁴⁶ a claim that could be interpreted using Kilpatrick's statement that the teacher should step in where the student gets lost and is unable to advance in his project, thus 'steer[ing] the child through these narrows'.⁷⁴⁷ Hansen claimed that there was qualitatively no difference between the work of the teachers and that of the students, merely a difference in experience, further strengthening the argument that the RUC interpretation of the teacher's role was in fact closer to Kilpatrick's ideas.⁷⁴⁸ These descriptions of the teacher's role at RUC would not sit well with Dewey's claim that:

Since the purpose to be carried out must come, directly or indirectly, from somewhere in the environment, denial to the teacher of the power to propose it merely substitutes accidental contact with some other person or scene for the intelligent planning of the very individual who, if he has a right to be a teacher at all, has the best knowledge of the needs and possibilities of the members of the group of which he is a part.⁷⁴⁹

Thus, paradoxically, even though Dewey was the favoured reference of the Teacher Training group, in fact, the educational outcomes at RUC and particularly the idea of student-led project work resembled more accurately the ideas of Kilpatrick.

A curious brew of Marx, Dewey and Constructivist Psychology

Beyond Negt and Dewey, there was a third major influence on the formation of the RUC model, namely cognitive psychology. Here, we meet Bjerg and Illeris again, but in their role as psychology researchers rather than project-work implementers. Illeris recounted how Piaget and the constructivists made it to the negotiation table at RUC:

Piaget was a third development. [...] He was unknown in Denmark until the middle of the 1960s. Then a group, at what called the 'Danish Pedagogical Institute' - which was an independent institute, which worked with the pedagogy of primary school - there were some researchers there who took up Piaget. And one of them was Thomas Nissen (he was a very, very close friend of Jens Bjerg) [who] was a great inspiration to *me*! And that was because I took the concepts of Piaget as are elaborated in this book: accommodation, assimilation, I used very much in this book to... well, to merge these things together.⁷⁵⁰

This quote merits some clarification: as well as being involved in the Teacher Training College, Bjerg, Nissen and Illeris were members of the Danish Institute for Educational Research (DIER; also called Danish Institute of Pedagogy Research or Danish Pedagogical Institute), an independent research institution founded in the 1960s in Copenhagen, which had for mission to 'carry out research and pursue studies relating to education' and 'to assist in the planning and coordination of educational experiments outside the Institute and the analysis of findings

⁷⁴⁵ Roskilde Universitetscenter, 'Betænkning Om Samfundsvidenskabelig Basisuddannelse', 68.

⁷⁴⁶ Berthelsen, Illeris, Clod Poulsen, *Projektarbejde*, 19.

⁷⁴⁷ Kilpatrick, 'The Project Method', 9.

⁷⁴⁸ Hansen, *En Koral I Tidens Strøm*, 68.

⁷⁴⁹ Dewey, *How we Think*, 274.

⁷⁵⁰ Illeris, in interview with the author, 21 August 2013.

derived from them'.⁷⁵¹ The three scholars therefore had two intellectual affiliations: one with the Teacher Training College, and the other with the DIER. From the former they took up the ideas of Dewey, from the latter the ideas of Piaget. Nissen, a close friend of Bjerg, translated Piaget's ideas into a booklet called *Indlæring og pædagogik* (learning and pedagogy), which did not receive much attention outside of the DIER but fueled the work of Illeris.⁷⁵² Illeris, a former travel agent turned psychology student, was writing his *magister* thesis when he became involved in the RUC project. He had already compiled a study of Bjerg's experiments at the Teacher Training College, and set about theorizing the RUC model as it unfolded before him as part of the theoretical requirements of his doctorate. The result was the publication of *Problemløserorientering og deltagerstyring* in 1974 as part of a series on psychology and pedagogy edited by Bjerg, thus two years after the opening of RUC.⁷⁵³

The publication of Illeris' first major work can be considered as the most important effort in weaving together the various ideas from different intellectual interest groups such as the Student Union, the DIER and the teaching studies educators. Indeed, *Problemløserorientering og deltagerstyring* attempted the seemingly impossible synthesis of Critical School ideas, Deweyan pedagogy, Piagetian cognitive psychology and a few other sources of education inspiration, prominent among which Rogers and Bruner.

Asking which of the book or the RUC curriculum came first is something of a chicken-and-egg question. Illeris was friends and colleagues with the people working to assemble the RUC curriculum from all sides of the intellectual argument, and a first-hand witness to the events unfolding there. He was not a passive observer describing a settled situation, he was enmeshed in the formation of the educational model as it happened. The most likely explanation is that he fed the concrete practices of the model into his theoretical work, which in turn fed into the model with novel ways of interpreting said practices in a feedback loop which was stronger in some Faculties than others and in some areas compared with others. For instance, Jens Højgaard Jensen, one of the pioneers of the natural sciences programme at RUC claimed that when it came to the natural sciences, Illeris' work was of little relevance as the inspiration came mostly from his previous experiments with projects at Copenhagen University.⁷⁵⁴ Perhaps Olesen summarized the mutual relationship between Illeris and RUC in the most appropriate way: 'I think it makes sense to say that it's not ideas that have been developed, it's practices that have been developed and adopted ideas'.⁷⁵⁵

It seems that those aligned with the Critical School paradigm considered Illeris to be more aligned with the psychological position than the Frankfurt School interpretation of

⁷⁵¹ Erik Thomsen, 'The Danish Institute for Educational Research', *Applied Psychology: An International Review* 10, (1961): 23–29

⁷⁵² Thomas Nissen. *Indlæring og pædagogik* [Learning and pedagogy]. (Copenhagen: Munskgaard, 1970)

⁷⁵³ Illeris, *Problemløserorientering og deltagerstyring*.

⁷⁵⁴ Jens Højgaard Jensen (*Assistant Professor of Physics at RUC in 1972*), in conversation with the author, at Roskilde University, January 5, 2013.

⁷⁵⁵ Olesen, in interview with the author, January 4, 2013.

education,⁷⁵⁶ even though Illeris dedicated almost 30 pages of his book to expounding the relevance of Negt and the Critical School as opposed to 20 pages on Piaget and cognitive psychology. Whilst this perceived bias in favour of constructivist psychological interpretations may have been frowned upon by the radical elements of the DSF, it could be seen as the crutch that Roskilde leaned on when the political storm began to cripple its model in the late 1970s.

It would be misleading to leave the intellectual history of RUC at that, without also adding that some Faculties, particularly Natural Sciences, did not display any particular theoretical inclination, either Marxist, Deweyan, constructivist or otherwise.⁷⁵⁷ Even within the Social Sciences, which was the bastion of Marxist thinking, some people such as Bent Rold Andersen objected to the theoretical biases of the programme, and particularly the idea of class struggle.⁷⁵⁸ But the internal dissent was drowned out by the massive political storm brewing in Copenhagen once it became apparent that the Social Democrat Rector Erling Olsen could not contain the radical voices rising from the University, and particularly in social sciences.

Conflicts and outcomes

It will hardly come as a surprise to the reader that a University with such vocal radical elements attracted virulent critique in a time of heightened anti-communist mood. Indeed, by 1974, Erling Olsen had been deposed and began openly criticising the Marxist leanings of the institution in the press.⁷⁵⁹ He accused the radical elements at RUC of fomenting social revolution and running the study programmes like a reading circle of *Das Kapital*.⁷⁶⁰ Hansen described in detail the troubled years that followed in which the students' demands for self-governance repeatedly met the opposition of the conservative government, as beautifully illustrated with the notorious quote from then-minister of education Ritte Bjerregaard: '*Hvis friheden - den ikke kan rummes i de rammer, så er det værst for friheden*'.⁷⁶¹ Some of the news headlines of the time show the angst that RUC brought about in Denmark, including the following rather amusing piece from March 1974 in which a journalist bemoaned the habit that RUC students developed of shouting 'pigs' at their professors in the corridors of the university.⁷⁶² He added a clear warning from Olsen: either the government slammed its fist on the table, or RUC would turn into a Red College.

⁷⁵⁶ A statement made by Jørgen Rafn (*Project Group Vocational Education at RUC in 1975*) and Olesen in interview with the author, at Roskilde University, January 4, 2013.

⁷⁵⁷ For instance, a report by Karin Beyer, physics teacher in the Natural Science Basic Education programme at RUC, notes very practical reasons for the project work such as improving group cooperation and giving people responsibility for their own work. There is no mention of Marx, experience, social consciousness or anything that might be given an intellectual affiliation. Beyer. 'On The Development Of The Idea Of Project-Organization', 2.

⁷⁵⁸ Hansen, *En Koral I Tidens Strøm*, 64.

⁷⁵⁹ Anon. 'Studienævn enig i Erling Olsens Roskilde-kritik' [Study Council agrees with Erling Olsen's Roskilde-critique], *Frederiksborg Amts Avis* (Copenhagen), February 9, 1974. RU-History Collection Mag RHS a 006. Roskilde University Library, Roskilde.

⁷⁶⁰ Hansen, *En Koral I Tidens Strøm*, 137.

⁷⁶¹ Hansen, *En Koral I Tidens Strøm*, 136. Translates as: 'If freedom can't be contained within these boundaries, too bad for freedom'.

⁷⁶² Svenning Dalgaard, 'De råber 'svin' efter professoren' [They cry 'pigs' after their professors], *Aarhus Stiftstidende* (Aarhus), March 17, 1974. RU-History Collection Mag RHS a 006. Roskilde University Library, Roskilde.



Figure 10: Headline from Aarhus newspaper March 1974 - ‘They shout “pigs” at the professors’

With such an anti-communist frenzy whipped up by the media, it is hardly surprising that the question of keeping RUC open or shutting it entirely found its way to a parliamentary vote in May 1976. Salling Olesen recalls this tense moment in history:

When this discussion went on in the Parliament, it had been preceded by student strikes all over the country, and there were 20 000 students standing outside parliament [...] arguing against this proposal. So it was a politicized issue, which had not only... It had very broad outreach to, I would say, the society at large. But it was also a discussion about university experiment and university reform, where we had really the role of being the political vanguard.⁷⁶³

The vote closed with 77 in favour of closure and 79 against, as one conservative Member of Parliament voted against his own party to bring the pro-RUC camp to a narrow victory. According to Hansen, after the vote, RUC gave up on its revolutionary ambitions, as the radicals realised that they had lost the support of the majority of the students.⁷⁶⁴ The downfall of *fagkritik* paved the way for the rise of Illeris’ Piagetian cognitive psychology as the defining theoretical support for the RUC model – a preference that pervades through to this day as evidenced by the lengthy reference made to Illeris in a recent publication on the theoretical underpinnings of RUC’s model.⁷⁶⁵ Given the historical shift from critical pedagogy to constructivism, one might ask: stripped of its Marxist roots, could the model be considered a project-organized sister of McMaster and Maastricht? For Roskilde, the answer is clearly no: too much historical water has gone under that bridge for the ridges to merge. To make their point, they persist in calling their model ‘problem-oriented interdisciplinary participant-directed project work’, an unwieldy moniker shortened to ‘PPL’.⁷⁶⁶ In addition, Roskilde University has recently set about renewing its commitment to critical theory through the formation of a ‘Critical Edge Alliance’, formed in June 2016 with other universities embracing a similar philosophical standpoint. However, Roskilde was not the only Danish university using the problem-oriented project approach – Aalborg University adopted the model only two years after Roskilde and gave it its own educational signature, eventually renaming it ‘PBL’ in the

⁷⁶³ Salling Olesen, in interview with the author, January 4, 2013.

⁷⁶⁴ Hansen, *En Koral I Tidens Strøm*, 161.

⁷⁶⁵ Andersen and Kjeldsen, ‘A Critical Review of the Key Concepts in PPL’, 17-36.

⁷⁶⁶ Anders Siig Andersen and Simon B. Heilesen, *The Roskilde Model: Problem- Oriented Learning and Project Work*, (Switzerland: Springer, 2015), ix.

1990s. The following sections will retrace the shift in the PPL model from Roskilde to Aalborg, and its eventual renaming to ‘PBL’ before considering whether the latter change was historically, philosophically and educationally warranted.

Aalborg University Centre

Aalborg University Centre (AUC) was the younger sister of RUC, opened in 1974 after years of lobbying on part of regional interest groups who desperately longed to have a university in the northern-most province of Denmark. Unlike the latter, AUC did not start as a *tabula rasa* but instead formed as an amalgamation of pre-existing higher education institutions onto which new Faculties and a new educational model were grafted. These pre-existing institutes included a branch of the Danish Engineering Academy, a School of Economics and Business, a School of Social Work and a Technical Engineering College.⁷⁶⁷ Although AUC was set to adopt the problem-oriented, project-based approach to education from the beginning, the combination of three key factors – the strong presence of the vocational studies, the close watch of local industry and lobbyists, and the distance from Copenhagen – ensured that neither the critical intellectual foundations nor the practice of the model were identical to those of RUC.

The Dizygotic Twins of Problem-oriented Project Education

The DSF was involved in the planning of AUC from the beginning, and some of the union’s representatives who had been involved in the planning of RUC joined the Planning Group of AUC. The concept of interdisciplinary project-organised *basisuddannelse* that had been developed at Roskilde was adopted at the request of the Danish Ministry of Education, with the proviso that the programme would be substantially modified. This resulted in the AUC Planning Group cutting its length in half; from two years to one.⁷⁶⁸ Such a move went against the wishes of the DSF who claimed that it would compromise the democratic process of the studies.⁷⁶⁹ Indeed, while the majority of the members of the Planning Group had economic and strategic reasons for wishing a shortened ‘basic education’ period, the DSF representatives carried over their commitment to Critical Theory from Copenhagen and sought to bring to Aalborg a watered-down version of the battle between left-wing ideology and conservative politics that was raging at RUC. They found a spokesperson for their ideas in Eva Hultengren, an organisation theorist and head of the study board for the Humanities at AUC.

Hultengren produced a number of written works throughout the 1970s that expounded her ideas on the intertwining of Frankfurt School Marxism and problem-oriented project-based *basisuddannelse*:

⁷⁶⁷ John S. Whitehead, ‘Denmark’s Two University Centres: The Quest for Stability, Autonomy and Distinctiveness’, *Higher Education* 10, no.1 (2007): 89-101.

⁷⁶⁸ Allan Clausen, *Kampen for et nordjysk universitet* [The Battle for a North Jutland University], 1st ed., (Aalborg: Aalborg Universitetsforlag, 1984). As with all of the Danish works on Aalborg University Centre, I am grateful to Claus Spliid, from the Department of Development and Planning of Aalborg University for the translations.

⁷⁶⁹ Jes Adolphsen, *I Satte os I Jeres Baner: Interviews med 19 vigtige personer I AUC historie* [You put us in your tracks: Interviews with 19 important persons in AUC history], 1st ed., (Aalborg: Aalborg Universitetsforlag, 1984).

REVOLUTIONS & RE-ITERATIONS

Man kan sige, at man arbejder ud fra en integration af fagene inden for en socialvidenskabelig teori. Marxismen er ingen overteori, men en integrerende og strukturerende socialvidenskabelig teori. Hvis vi vender tilbage til universitetscentre, så kan man netop sige at marxistisk teori og metode er meget anvendelig i basisuddannelserne på grund af de brede problemstillinger, man arbejder med der.⁷⁷⁰

For Hultengren, ‘problems’ were means by which a process of consciousness-production in the sense intended by Negt could be brought about through the principle of exemplarity. The popularity of Frankfurt School ideas among some of the more radical students led to verbal and physical confrontations with the government, as recalled by John Houman Sørensen, the DSF representative of the AUC planning group:

In the Autumn of 73, there was a catastrophic election in the parliament. The so-called ‘Progress Party’ came in – it became very chaotic, and after that, the parliamentary support was not that strong. Even when the university here started in September 74, there was a fear that it would be rolled back by the new *bourgeois* government - be rolled back to only technical and commercial studies. It changed over to a minority government by the more respectable *bourgeois* parties. They were thinking: ‘Oh, Aalborg has gone too far, we only want this technical and commercial education’. Against that, there was mobilization, several times. And then, the chairman of the board and his board were having a meeting here in Aalborg and they also were advising to close down the humanities at the university level – the level above that of Bachelor. They announced that they would recommend that to the government. But that meeting was blocked – students shut the doors [...] And they kept them there until the last plane from Aalborg to Copenhagen had left, and then only did they dissolve. But they could not go back to Copenhagen that night.⁷⁷¹

But in fact, despite these occasional jocose political altercations, the influence of Hultengren’s ideas in Aalborg was marginal – confined to some branches of Social Sciences and Humanities.⁷⁷² The engineers that had been brought into the fold of the University from the pre-existing technical colleges had a hard enough time adapting to the pedagogical requirements of the problem-oriented project-model, let alone any mention of Marx! Their painful transition from traditional to reformed pedagogy was recounted with some black humour by Mona Dahms, an eye-witness to the transformation:

So in the faculty of engineering and science, I would say the first seven or eight years or so were pretty traumatic actually. I normally say to people a little bit jokingly but with an element of truth in it that the curb of numbers of university teachers admitted to the psychiatric hospital in Aalborg rose quite quickly. And there was even a case of suicide, which presumably was caused by the work situation. That’s at least the explanation that we got afterwards. So it was not an easy transformation.⁷⁷³

⁷⁷⁰ Eva Hultengren, *Problemløsering, projektarbejde og rapportskrivning*. [Problem-orientation, Project-work and Report writing], (Ålborg: Ålborg Universitetsforlag, 1979), 16. Translates as: ‘You could say that you work from the integration of subjects within a social science theory. Marxism is no super-theory but an integrating and structuring Social Sciences theory. If we return to the university centres you could say that Marxist theory and methods are very useful in *basisuddannelse* due to the broad problem-topic you work with there’.

⁷⁷¹ John Houman Sørensen, (*former DSF representative at Aalborg University Centre*) in interview with the author, January 14, 2013. Incidentally, Sørensen was also married to Hultengren.

⁷⁷² The view that Negt was of importance in social science but not in the dominant natural & technical sciences faculty was put in sharp relief by the contrasting viewpoints of historical witnesses from both sides: Lone Krogh Kjær-Rasmussen, (*former social sciences student at Aalborg University Centre, Associate Professor at Aalborg University*) in interview with the author, at Aalborg University, January 11, 2013 ; and Finn Kjærdsdam, (*former Dean of Engineering and Science, former Rector of Aalborg University*) in interview with the author, at Aalborg University, July 10, 2014.

⁷⁷³ Mona-Lisa Dahms (*Associate Professor at Aalborg University*) in interview with the author, at Aalborg University, January 14, 2013.

In fact, the transformation relied far more on social negotiation and tentative practice-building than on theoretical foundations of any sort.⁷⁷⁴ Hultengren was even derided by some of her contemporaries as the ‘high-priestess’ of the ‘prophet’ Negt, signalling that perceived blind devotion to psycho-societal critique was not taken too seriously at AUC.⁷⁷⁵

The constructivist psychology component of Illeris’ work, however, became increasingly popular as the influence of the Frankfurt School waned. His books were far easier to read and understand than the obscure writings of the Critical Pedagogy movement, especially for the practically-minded engineers. Dahms described her first encounter with Illeris’ work, through her engineering students that were seemingly adepts of cognitive-constructivist ideas about education:

I was to become a supervisor for a group of ninth semester students – they were a trial group of Masters students. They had done their Bachelors in the engineering academy and then they had created this trial programme just to find out whether they could at all within the university manage a Masters programmes. [...] And you were asking before about Knud Illeris – and these guys, there were 7 of them – these guys had read Knud Illeris. They knew Knud Illeris forward and backwards and you could wake them at two o’clock in the night and they would quote Knud Illeris to you!! [laughter] So I came home – not having studied either Knud Illeris or anything else about PBL, and I learnt an extreme lot from these guys, from being their supervisor.⁷⁷⁶

Illeris was not just popular among the engineers; Lone Krogh, a social sciences student from the first cohort to graduate from AUC explained that in her experience as a project-work student in the 1970s, the methodology behind problem-orientation was expressly borrowed from the psychologist’s work.⁷⁷⁷ Like at RUC, however, there are faculty members, such as the former Rector Finn Kjærdsdam, who claim that there were no strong theoretical foundations to the education at AUC, but that the model was in a constant state of evolution in response to the situation on the ground, driven by pragmatic concerns instead of theoretical ideals.⁷⁷⁸ Like at RUC, then, idealistic intellectual inspirations were confronted with the practical requirements of day-to-day education management. Although the quest for new forms of education (whatever they may be) took precedence over theoretical preferences at AUC, the resulting programme was still very much more student-driven than what had been seen previously in Danish higher education: 50% of students’ time was and still is occupied with problem-oriented project work. Unlike at RUC, however, left-wing ideology went down almost without a fight in Aalborg, leaving only a smattering of constructivist pedagogy to inform a model that was essentially built to accommodate the demands of regional interest groups and students from Northern Jutland rather than radicals in search of a spiritual home. This difference, explains John Whitehead, ensured a smoother passage through the political storms for Aalborg than for its more exposed sister in Roskilde.⁷⁷⁹ A brief mention of the name of either of the institutions

⁷⁷⁴ Virginie F.C. Servant and Claus M. Spliid. ‘The construction of teacher roles at Aalborg University Centre: a historical perspective 1972-1982’. Unpublished manuscript (2015).

⁷⁷⁵ Hans Siggaard Jensen and Knud Knudsen. 1984. *Udforskning* [Exploration]. (Aalborg: Aalborg Universitetsforlag, 1984), 53.

⁷⁷⁶ Dahms, in interview with the author, January 14, 2013. Note the use of the term ‘PBL’. We shall return to it in the next section.

⁷⁷⁷ Krogh Kjær-Rasmussen, in interview with the author, January 11, 2013.

⁷⁷⁸ Kjærdsdam, in interview with the author, July 10, 2014.

⁷⁷⁹ Whitehead, ‘Denmark’s Two University Centres’, 100.

to the other would illustrate to any interested reader how much the educational and political rift between Roskilde and Aalborg has grown throughout the years. It would be barely exaggerated to say that to a foreign observer, it seems that the former sees the latter as mercenary engineers exploiting their revolutionary model for commercial purposes, and the latter sees the former as outmoded socialist trouble-makers refusing to enter the modern age. Perhaps the fact that in the Aalborg adopted the term ‘PBL’ to describe its educational model in the 1990s while Roskilde staunchly refused to do so serves to illustrate the split between the two sibling institutions.

Calling Engineering Project Education ‘PBL’: a Pragmatic Turn

Of course, Aalborg comprised more than just an engineering Faculty – it was designed to have one Social Sciences, one Technical and Natural Sciences and two Humanities entry-level programmes, all of which were given equal consideration in the planning phase.⁷⁸⁰ Thus far, we have told the Aalborg story as if it were a unified grand scheme but in fact, problem-orientation was interpreted in quite different ways in the various institutes at AUC, with each developing its own distinct educational identity. Whitehead picked up on this phenomenon when he visited the institution in 1979:

One could even sense a certain rivalry, say between engineers and the humanists, to perfect their different programs. There appeared to be no single model of distinctiveness forced on the institution. Thus in looking toward Aalborg's future the author could discern no overall blueprint to be followed.⁷⁸¹

In fact, the only requirement imposed university-wide was that 50% of the curriculum consist of project-work and the other 50% of taught courses, of which half were to be linked directly to the project. Everything else was pretty much open for discussion and interpretation, ending as a social negotiation between the teachers, students and administration staff of each Faculty. How does one explain in this context the predominance of Engineering in association with the Aalborg model, and how did this lead to the adoption of the term ‘PBL’? A first explanation might be that despite the relatively equal attention given to all studies on paper, the nascent University Centre accommodated two pre-existing engineering institutions, therefore giving the new institution a technical bias before it had even begun. In terms of number of students, although the Technical and Natural Sciences Faculty only had 303 students compared with Social Sciences’ 362 when they opened in 1974, the number of students integrated from the pre-existing institutions to complete their studies at Aalborg University Centre was 319 social scientists and 462 engineers, thus giving quite some weight to the technical studies.⁷⁸² In 1979, the Faculty Technical and Natural Sciences overtook Social Sciences in terms of student recruitments, and it has remained so ever since. Secondly, as many of those associated with the Faculty of Engineering pointed out, engineering naturally lends itself to projects, it could be

⁷⁸⁰ Henrik Nielsen, Jørgen Poulsen and Per Salomonsen, *SAMF BASIS – en vurdering af den samfundsvidenskabelige basisuddannelse ved AUC 1974/75 og 75/76*. [Social Science Basis-year – an assessment of the social science basis-education at AUC 1974/75 and 75/76.], Det samfundsvidenskabelige fakultetsnævn, 2. udgave, December 1976, (Ålborg: Ålborg Universitetscenter, 1976).

⁷⁸¹ Whitehead, ‘Denmark’s Two University Centres’, 99.

⁷⁸² Preben Sørensen, *Aalborg Universitet i 40 år: udviklingen belyst i tal*. (Aalborg: AAU Kommunikation, 2014), 5.

considered the project-education milieu *par excellence*, and may therefore have made sense of the model faster, despite initial opposition from traditionally educated teachers.⁷⁸³ Thirdly, engineering graduates from Aalborg became quite popular with employers in the region, thus, as Whitehead argued, making themselves into a strong voice for alternative engineering education rather than a sub-par competitor with the Danish Technological University.⁷⁸⁴ It should also be considered that whilst the Faculties of Humanities and Social Sciences could be seen as the younger and less radical sisters of their Roskilde counterparts, RUC had no Engineering programme, thus allowing AUC to claim sole ownership of the problem-oriented project work model in Engineering.

It is difficult to know whether this was a cause, a consequence or both of the growing popularity of this new model of engineering education, but the fact of the matter is that the Faculty of Engineering began to publicise its model nationally and internationally in the late 1980s and early 1990s. As part of these efforts, Kjærdsdam, the Dean of Engineering and Science at the re-named Aalborg University and his colleague Stig Enemark from the planning and surveying programme wrote a bilingual book misleadingly called *The Aalborg Experiment*; the booklet is in fact exclusively about the Engineering and Natural Sciences experiment at Aalborg.⁷⁸⁵ It was around that time that the term ‘PBL’ began surfacing in reference to the Aalborg Model. Kjærdsdam, in his capacity as Dean, claimed responsibility for this appropriation, and explained it as follows:

It is to be understood. If you should be exact, you could call it ‘problem-oriented, project organized’. But nobody understands that when you discuss it with education, with ordinary people, with politicians, with other universities. PBL is a variety of different things. But this is the Aalborg model. It has always been organized in projects, with students in courses and that’s the strong part of it. [...] What happened was that at that time, there were a lot of universities all over the world which were asking us to help and being involved in maybe 100 universities, from China to Japan to the US and Latin America, in universities which want to introduce something like that. And when you give a lecture and you start... ‘POPBL’ or something like that, they just look like a question mark. So just to get into it, you have to have a more simple word. [...] So it was maybe ‘PBL’ in opposition to traditional education or disciplines.⁷⁸⁶

Some of his colleagues from other departments were somewhat more cynical about this choice of words. One of the professors in the Faculty of Social Sciences, explained that this strategic move was very much driven by and for the technical sciences:

We are much known outside this country due to our use of this pedagogical model in the technical sciences, in engineering education. But no person on earth knows that we are using exactly the same model in the social sciences and humanities. [...] So there have been these very early trends towards travelling in the world and telling people about: ‘We’re using this kind of model of educating new engineers’ – while in social sciences, we said: ‘We don’t have this need to tell everybody that this is our pedagogical tool. We want them to respect our *research* and so on’. But that’s just another way of handling it. I have been very opposed to calling anything we did PBL for the very same reasons. But lately, I have just accepted it,

⁷⁸³ This opposition was voiced in a letter to the Ministry of Education from 1975 demanding a return to traditional forms of education. *SR Nyt*, årg. 3 nr. 17/18, 1977 (Ålborg: Ålborg Universitetscenter, 1975-1982), 25; Center Nyt (Ålborg: Informationsudvalg Ålborg Universitetscenter, 1975-1982).

⁷⁸⁴ Whitehead, ‘Denmark’s Two University Centres’, 99.

⁷⁸⁵ Finn Kjærdsdam and Stig Enemark, *The Aalborg Experiment: Project Innovation in University Education*, (Aalborg: Aalborg University Press, 1994).

⁷⁸⁶ Kjærdsdam, in interview with the author, July 10, 2014.

because it has been a top-down decision here that we *call* it PBL. And then afterwards – we mention that it’s a special variant inside PBL, the broader PBL concept.⁷⁸⁷

The use of the term ‘PBL’ to describe the Aalborg model was enshrined in the academic world by a paper written in 1996 by Anette Kolmos, a former AUC student turned Engineering education researcher, with the title: ‘Reflections on Project Work and Problem-based Learning’.⁷⁸⁸ At the time this article was written, a clear desire to justify the use of the term of medical origin for Engineering project-work was apparent. By the time the follow-up article ‘Characteristics of problem-based learning’ emerged in 2003, the question was no longer asked: the article was written in collaboration with former Maastricht researcher Erik de Graaff.⁷⁸⁹ In the years following, Kolmos and her team successfully applied for a ‘UNESCO Chair for Problem-based Learning in Engineering Education’, established at Aalborg in 2007, and later for ‘the Aalborg Centre for Problem Based Learning in Engineering Science and Sustainability under the auspices of UNESCO’, launched in 2014.⁷⁹⁰ Today, some researchers from both the medical and the Danish tradition work together under the banner of ‘PBL’, and some blended programmes have even started to emerge in medical education and in engineering education.⁷⁹¹ There are of course those who are strongly opposed to calling the Aalborg model ‘PBL’, pointing to the absence of said model in the scientific literature on problem-based learning.⁷⁹² But the fact remains that the term does get used internationally to describe the ‘Aalborg model’. Among the reigning confusion, it is important to clarify once and for all to what extent the principles underlying the McMaster-cum-Maastricht model and the Aalborg model overlap or differ. If we cannot agree on one definition of PBL, at least we may hope to achieve a modicum of clarity on this point.

Problem-oriented project work and problem-based learning: ‘Mind the Gap!’

This treatise is not the first to consider the distinction and similarities between problem-based learning and project work, and yet surprisingly few have considered arguments in favour and against the integration of project work under the PBL umbrella. This is surprising considering

⁷⁸⁷ Erik Laursen, (*Professor in the Faculty of Social Sciences, Aalborg University*) in interview with the author, at Aalborg University, January 11, 2013.

⁷⁸⁸ Anette Kolmos. ‘Reflections on project work and problem-based learning’. *European Journal of Engineering Education* 21, no. 2 (1996): 141-148.

⁷⁸⁹ Erik de Graaff, and Anette Kolmos. ‘Characteristics of problem-based learning’. *International Journal of Engineering Education* 19, no. 5 (2003): 657-662.

⁷⁹⁰ ‘About us’, *The Aalborg Centre for Problem Based Learning in Engineering Science and Sustainability under the auspices of UNESCO*, accessed December 2015. <http://www.ucpbl.net/about/>

⁷⁹¹ The Faculty of Medicine of Aalborg University, opened in 2010, uses a hybrid of the Maastricht and project-model of PBL. Diana Stentoft, Meg Duroux, Trine Fink and Jeppe Emmersen. ‘From cases to projects in problem-based medical education.’ *Journal of Problem Based Learning in Higher Education* 2, no 1 (2014): 45-62. The Faculty of Mechanical Engineering of Universiti Teknologi Malaysia in Johor Bahru also uses a mix of project work and medical model PBL since 2003. Mohd Yusof, Khairiyah, Zaidatun Tasir, Jamalludin Harun, and Syed Ahmad Helmi. ‘Promoting Problem-Based Learning (PBL) in Engineering Courses at the Universiti Teknologi Malaysia.’ *Global Journal of Engineering Education* 9, no. 2 (2005): 175–84.

⁷⁹² In a recent bibliometric analysis of research on problem based learning, Denmark did not feature in the top 15 countries for publications between 1992 and 2013. No Danish author was on the list of PBL researchers with 10 or more publications. Luis A. de Pinho, Fabio B. Mota, Mariza V. F. Conde, Luiz A. Alves, and Renato M. Lopes. ‘Mapping Knowledge Produced on Problem-Based Learning between 1945 and 2014: A Bibliometric Analysis’ *Creative Education* 06, no. 06 (2015): 576–584.

what is at stake for institutions on both sides of the fence: on the one hand the integration of the findings of one field of research into the other, with joint conferences, papers and research grants, and on the other hand (perhaps more lucratively) the issue of exporting specific educational models to reform-hungry countries such as China, Brazil or Saudi Arabia. Perhaps the recentness of these stakes serves to explain the scarcity of literature on the issue. In the past fifteen years, many tertiary institutions have come under pressure from their governments, ministries of education and governing boards to look into ‘PBL’ to close the gap between education and workforce needs, which strengthens the case for clarifying what exactly one is liable to find under the label ‘PBL’. This clarification has real-world stakes since the definition of the boundaries of PBL acts as a prescription for the development of future educational programmes. To answer it, we shall begin by reviewing what has been said on the subject to date, and then provide our own answer.

Arguing for the distinction between PBL and project work.

Most authors will admit that there are indeed common points between the two methods. In 1986, Schmidt acknowledged they both promote student-centred rather than teacher-centred learning, both take place in small groups, both enable the students to apply knowledge to real-life situations, and both increase student motivation to learn, which could lead to a capacity for lifelong learning.⁷⁹³ In addition, he recognised that both problem-based learning and project work encouraged self-directed learning and interpersonal skills. In 2000, Perrenet, Bouhuijs and Smits recognized that PBL and project work shared a commitment to interdisciplinarity, self-direction and collaboration in an analysis focused specifically on the Maastricht model of PBL and the Aalborg model of project work as applied in the Maastricht Knowledge Engineering programme.⁷⁹⁴

For Schmidt, however, the chief difference between PBL and project work lay in the nature of the problems used. He argued that the size, complexity and scope of the problems was much larger for projects, and explained this difference in that the purpose of problems in PBL was to stimulate the acquisition of knowledge, whereas the purpose of problems in projects was to apply knowledge, and idea restated by Perrenet, Bouhuijs and Smits.⁷⁹⁵ The authors recognized that PBL and project work shared a commitment to interdisciplinarity, self-direction and collaboration. However, they argued in line with Schmidt that self-direction was far greater in project work, but given that knowledge needed to be acquired prior to the project, the latter had to be run alongside extensive hours of regular courses.

Given this, Schmidt suggested that project work was too complex to be used in the early stages of study, as students needed a fair amount of prior knowledge to work in this way, whereas

⁷⁹³ Henk G. Schmidt, ‘Probleemgestuurd onderwijs en projectonderwijs: overeenkomsten en verschillen [Problem-based learning and the case study method: similarities and differences].’ *Tijdschrift voor Hoger Onderwijs* 4, (1986): 38-46.

⁷⁹⁴ J.C. Perrenet, Peter A.J. Bouhuijs, and J. Smits. ‘The Suitability of Problem-Based Learning for Engineering Education: Theory and Practice.’ *Teaching in Higher Education* 5, no. 3 (2000): 345–58.

⁷⁹⁵ *Ibid.*

PBL was suitable for beginners. Another consequence of this difference was that much more attention had to be given to problem-formulation in PBL, as problems were the cues to learning, whereas learning having already taken place prior to the project, the format of the problem therein was not so important and could be left to the students themselves. Ironically, this point was also strongly put forward by Andersen and Kjeldsen from Roskilde University who wrote:

The crucial differences between the two concepts [PBL and Project Work] concern the questions of who formulates the problem for the participants to work with, and how their study work is progressing. In problem-based learning, the teachers formulate the problem or the problem scenario, and draw up a list of references. [...] In the tradition of problem-based learning, it is the teachers and not the students who discuss what requirements must be formulated with regard to a good problem or problem scenario. In the tradition of problem-oriented, interdisciplinary and participant-directed project work, it is viewed as crucial that the students formulate the problems of their project work, and that they themselves find literature of precise relevance to the study. This pedagogical model is inspired by models of research work. This means that students study in ways that are very similar to the ways researchers conduct their research projects, although they are supervised by a skilled researcher. This makes the students' problem formulation a very important part of their project work.⁷⁹⁶

The book from which this comparison is extracted further marks the point by consistently referring to the Roskilde model as 'PPL' rather than PBL. Additionally, Schmidt argued that projects and PBL made different demands on teachers – in projects, teachers were equal members of the team, as invested in the outcomes of the project as the students themselves. However, in PBL, the problems being purely educational, they did not constitute intellectual challenges for the tutors, who could concentrate on their pedagogical function. Savery disagreed with this statement, making the case that the scope of projects was usually defined by teachers, and therefore their role in the project was simply to ensure that students follow the procedures set out for them.⁷⁹⁷ Savery's view on projects was arguably much narrower and more practice-oriented than Schmidt's. The latter placed project work further down the student-centred end of the learning spectrum, whereas the former thought PBL was half-way between student-centred and teacher-centred learning, revealing some confusion around the notion of 'projects'. It is precisely this lack of a clear definition that allowed scholars to argue for the merging of the PBL and project work models on the grounds that some projects could be interpreted as problem-based.

Arguing for the merging of both models under the term 'PBL'.

In 1996, Kolmos, hailing from the Aalborg engineering project curriculum and arguing for the assimilation of PBL and project work, chose a new angle by proposing that problem-based learning and project work should not be compared on a level plane because project work concerned the organizational structure of the learning, whereas PBL concerned the educational structure of learning.⁷⁹⁸ If project work regarded the way in which the educational experience is organized practically rather than the content or educational principles of the learning, then

⁷⁹⁶ Andersen and Kjeldsen, 'Theoretical Foundations of PPL', 14.

⁷⁹⁷ John R. Savery. 'Overview of Problem-Based Learning: Definitions and Distinctions.' *Interdisciplinary Journal of Problem Based Learning* 1, no. 1 (2006): 9–20.

⁷⁹⁸ Anette Kolmos. 'Reflections on Project Work and Problem-Based Learning.' *European Journal of Engineering Education* 21, no. 2 (June 1996): 141–48.

three types of project work could be identified: assignment projects, which were teacher-driven, application-of-knowledge projects of the type described by Savery; subject-projects, in which students were given a broad theme from which to derive a problem and then seek to resolve it; and problem-projects, in which students had to direct every aspect of project from problem-formulation and methods to final product. Kolmos argued that whereas problem-based learning, being a set of student-centred learning principles, was not compatible with the first type of project, it could be superimposed onto the second and third. Therefore, according to Kolmos' point of view, the way in which McMaster and Maastricht organize their tutorials in month-long or week-long problem cycles may differ from the semester-long problem-cycles of Aalborg, but those are simply organizational issues; whether one looks at medical problems in Maastricht or problem-projects in Aalborg, the educational principles of problem-orientation remain constant across the board.

Kolmos refined this argument with De Graaff in 2007; while reiterating the distinction between the three types of projects, the authors suggested that the difference in length of the problem cycle was caused by the nature of the discipline in question, namely medicine *versus* engineering rather than a difference in the education method.⁷⁹⁹ The core principles, they argued, remain the same across the board and could be expressed along three axes: learning, contents and the social aspect. Thus, according to the authors, all PBL programmes whether of the Danish, McMaster, Maastricht or other models, feature a problem as the starting point of the learning process; this problem serves both to trigger motivation in students and provide an authentic context for learning. Additionally, they argued, PBL is by nature interdisciplinary, and problems serve as examples of broader concepts and principles. Finally, self (or participant) direction and collaboration form the core of the social component of the learning. Thus, projects were not necessarily merely applications of knowledge but could also be the starting point of knowledge acquisition. Using this argument, the authors argued in favour of 'merging models' and labelling the Danish model with the same appellation as the McMaster and Maastricht models.⁸⁰⁰

These arguments contribute to the beginnings of a debate on the integration of PBL and project work with a clear line drawn between the position held by Maastricht and Roskilde on the one hand (the separation position), and the position taken by Aalborg on the other (the merging position). However, the literature fails on several points: firstly, it seems that the contributors to this debate are not arguing from comparable standpoints. In summary, Roskilde argues for a historical distinction, Maastricht for an organisational one, and Aalborg for a philosophical merging. Secondly, very little empirical evidence has been provided in the literature to support the points made: the arguments from both sides were mostly made without reference to concrete examples in past or current practice. This makes the outcome of the discussion all the harder to grasp given that it is never clear precisely which sort of practice the authors are referring to. After all, there are almost as many ways of implementing PBL as there are PBL-

⁷⁹⁹ Erik de Graaff and Anette Kolmos. 'History of Problem-Based And Project-Based Learning'. In *Management Of Change: Implementation Of Problem-Based And Project-Based Learning In Engineering*, ed. Erik de Graaff and Anette Kolmos, 1st ed. (Rotterdam: Sense Publishers, 2007), 6.

⁸⁰⁰ De Graaff and Kolmos, 'History of PBL and Project-based learning', 5.

practicing schools, and the same is true for project work. This makes it very difficult to know exactly what educational practices the authors are talking about and therefore renders deriving any sort of broad historical, philosophical or organisational principles all the more challenging. To alleviate the problem, the following sections will present a historico-empirical comparison between McMaster, Maastricht, Roskilde and Aalborg. This will be done following two broad lines of inquiry: we shall firstly look at the differences and similarities in the nature of the problems used in both models, before tackling the question of the learning process. Finally, this chapter will close with a suggested way out of the PBL-naming debate.

On the nature of problems

In previous chapters, we identified the differences in the nature of PBL problems associated with the Barrows or the Schmidt school of thought. On the one hand, we found problems as simulation of professional practice, on the other, problems as ill-defined triggers for epistemic curiosity and activation of prior knowledge. What of the Danish model? We need to discriminate between Roskilde and Aalborg, which did not have the same understanding of problems, nor for that matter did Faculties within Aalborg itself. Additionally, their ideas on problems changed over time as they lost their revolutionary lustre.

Let us begin with the Roskilde model as it was thought out in 1970, at the apogee of its radical ambitions. In the ideal of the *fagkritik* movement, problems emerged from the conditions of society, thus implicitly, from class conflict. This ideal was reflected in the founding documents of the University, as for instance in the report establishing the Basic Education programme in Humanities:

Problems are functions of societal oppositions. The outset of the study work, thus, must be an identification of language-social problems, and the existing theory and methods are pulled in as the problem-solving makes it necessary. Since the starting point is the problem in its language-social connection, and not in the first instance what is presented as a problem in a given theoretical framework, the student gets the opportunity to relate critically to existing theory.⁸⁰¹

What we can see from this description is the centrality of the problem in the learning process. This is not, as Savery and Schmidt had assumed, a case of applying knowledge acquired through traditional course work. Instead, the objective is to deconstruct reality to access its hidden social structures, beyond existing disciplinary standpoints. This point was emphasized also in the founding documents of the Social Sciences:

Since the starting point is the problem, meaning this social reality – not just the way in which it presents itself in available empirical data or the way in which it is formulated as a problem in the systematics of a discipline. The student gets the opportunity to relate critically to the existing theory from the outset. Contrarily to the traditionally-oriented social sciences education, where the reality systematization (the theories) easily assumes a character of a priori true statements. The outset, where there is a conscious striving towards investigating the theory's 'usability' in relation to the 'problem', both gives a more motivating learning process as well as a scientifically more fruitful entry to the study of social sciences.⁸⁰²

⁸⁰¹ Interimstudienævnet for det humanistiske hovedområde, 'Betænkning Om Den Humanistiske Basisuddannelse'. Translation by Rune Larsen. The original is available in print in the archives of Roskilde University.

⁸⁰² Roskilde Universitetscenter, 'Betænkning Om Samfundsvidenskabelig Basisuddannelse'. The Danish text was unfortunately misplaced after translation, although the original is still available in print in the archives of Roskilde University.

In this sense, knowledge *cannot* be acquired beforehand, since the entire point is to deconstruct the accepted truths of disciplinary theorizations. Certainly, one must know the theories to deconstruct them, but in this model the theories are not fed to the students, they arise in confrontation with social reality, and the student must investigate them as they relate to the problem. Seen in this light, the process is not so different from the McMaster PBL – the problem triggers the need for an explanatory theory. But there is a significant difference in that the Roskilde model required the further step of critically deconstructing the theories whereas medical knowledge was taken as unquestioned truth at McMaster and Maastricht. The key idea for Roskilde was the critical concept of *praxis*, as described by Kirk Astroth, an Icelandic student who wrote a report on RUC education in 1973: ‘it is one of the themes of Roskilde that the education attempt to unite theory and praxis and make the knowledge gained applicable to social problems’.⁸⁰³ *Praxis* is a term most often associated in education philosophy with the work of the Brazilian critical education philosopher Paulo Freire, defined by the latter as ‘reflection and action upon the World in order to transform it’.⁸⁰⁴ Derived of late-Marxist thinking, *praxis* for Freire refers to the process by which theory becomes enmeshed with social reality to catalyse conscientization and kick-start the struggle for liberation. At Roskilde, this reflected the hope that by addressing the conditions of society, no matter from the standpoint of the humanities, social sciences or natural sciences perspective, the students would be able to transform those social conditions, as expressed by Karin Beyer, a lecturer in physics at RUC:

By taking the starting point in real problems from practice, the opportunity is attained of making project-work, which can contribute results of significance outside the educational set-up of the participant. In this context can be mentioned contributions on the role of, and policy on, the natural sciences as well as more or less pronounced action research where the aim not only is an analysis and understanding of the work but also direct influence on the real situation being studied.⁸⁰⁵

In summary, the sorts of problems that came out of Roskilde in its early years were definitely socially if not socialistically oriented, particularly in the Social Sciences. This is evidenced by a selection of social sciences project titles extracted from the Roskilde digital archive dating back to the years before the political troubles of the late 1970s.⁸⁰⁶

⁸⁰³ Kirk Astroth, *Roskilde University – Observations*. Unpublished paper from 1973. RU-History Collection [file unknown], Roskilde University Library, Roskilde, 12.

⁸⁰⁴ Paulo Freire, *Pedagogy Of The Oppressed* (New York: Bloomsbury, 2000), 51.

⁸⁰⁵ Beyer, 'On The Development Of The Idea Of Project-Organization', 2.

⁸⁰⁶ Danish titles extracted from the Roskilde Digital Archives, translated and sent to the author in personal communication by Henning Salling Olesen on May 7, 2016, <https://safir.ruc.dk/sites/rap/pub/search.html>.

REVOLUTIONS & RE-ITERATIONS

Year	Project Title
1972	<ol style="list-style-type: none"> 1. The Village School 2. Imperialism – the Asian Mode of Production.
1973	n/a
1974	<ol style="list-style-type: none"> 1. Brazil: a study of production and class structures from the early colonial period 2. Social security benefits 3. On Workplace Accidents 4. The state theories of Aristotle
1975	<ol style="list-style-type: none"> 1. Class analysis of clerks in the private sector 2. State – industrial structure and capital building in Denmark 3. Female clerks: revisiting the class position of female clerks 4. Danish Capitalism in crisis: an analysis of the 1930s and 1970s 5. Trade Unions, the unity of action and the wave of strikes in 1974/75 6. The origins of a pauperization theory in the capital relation

Table 14: Sample list of social sciences project titles at RUC 1972 - 1975

These problems, chosen by the students in consultation with their project supervisors, cover central themes of Marxist and critical theory, namely class analysis, imperialism, trade unions, capital relations, welfare and the role of the State in economics. Although the Marxist undertones of problems were particularly strong at Roskilde, they represent the typical post 1960s aspiration of social transformation that swept through higher education all over the World, from Berkeley to Paris. This aspiration was not entirely alien to McMaster, where tentative outreach programmes were developed with remote indigenous communities of Ontario in the hope of bettering their access to healthcare.⁸⁰⁷ McMaster even developed a so-called ‘Horizontal Programme’ with the aim of transforming physician attitudes towards the societal aspects of medicine.⁸⁰⁸ This programme did not survive the first wave of reforms at McMaster, and the outreach programmes never amounted to much, but it does show that social concerns were not the exclusive appanage of the student movement. Maastricht also had its own ideas on social transformation; the *basisfilosofie* of 1972 voiced great concerns for the changing conditions of society and the need to train physicians who would be able to provide more community-oriented care.⁸⁰⁹ Schmidt prefaced his 1979 paper ‘Leren met Problemen’ with a lengthy introduction on the need to increase the number of first echelon (primary care) doctors to care for the community.⁸¹⁰

In fact, from there developed an entire following of PBL-practicing schools hailing from the entire world, beginning with University New Mexico (UNM) in Albuquerque in the mid 1970s, who saw community-orientation as their prime focus. This approach, described in great detail

⁸⁰⁷ The need to provide better care to the Region of Ontario was noted by Dave Sackett in 1969. Dave L. Sackett ‘Objectives of The Faculty Of Medicine Of McMaster University’. Draft report from January 1969. Objectives of the Faculty School of Medicine - HHS/FHS Archives: Box 145.8;2. McMaster University, Hamilton, ON.

⁸⁰⁸ Horizontal Programme Planning Committee. ‘Interim Report’. Report from September 20, 1968. Educational Programme Committee - 1968 - HHS/ FHS Archives: Box 232.4;6. McMaster University, Hamilton, ON.

⁸⁰⁹ ‘Basisfilosofie Achtste Medische Faculteit’. *Medische Contact*, 27 (1972): 879-84.

⁸¹⁰ Henk G. Schmidt, ‘Leren met problemen, een inleiding in probleemgestuurd onderwijs’. *Handboek voor de onderwijspraktijk*, (Deventer: Van Loghum Slaterus, 1979).

by Arthur Kaufman in his retrospective on the UNM programme, consisted in combining the McMaster model of PBL with lengthy internships and clerkships in underserved rural communities.⁸¹¹ Students would be sent out to help primary care physicians in remote communities for up to a semester, using the problems of the community as the starting point of their learning. This form of socially-conscious, community-oriented problem-based learning was so popular, particularly among medical schools in developing countries such as Egypt, Nigeria, Malaysia or the Philippines that these schools banded together under the auspices of the World Health Organization to form the Network of Community-Oriented Educational Institutions for Health Sciences. By 1983, the Network comprised 37 members and observers, met all over the World at conferences and organized exchanges of faculty members across the globe, particularly from McMaster and Maastricht towards developing countries.⁸¹² Not all community-oriented schools of medicine implemented PBL with equal success, but it is indisputable that PBL spawned a large movement geared towards societal change in the field of medicine.⁸¹³ This change was most certainly of a practical and pragmatic nature, namely, to increase access to and concern for primary care medicine in underserved areas. There was no underlying critique of society, no theoretical ambition to this plan, and no struggle for liberation implied; therein lies perhaps the difference with the Roskilde model, at least as far as it was envisaged by the student movement in its early years.

In summary, when comparing the original ideas on problems of McMaster, Maastricht and the early Roskilde models, one will find that both espoused the 1960s ambitions of social improvements. However, these concerns were of a very pragmatic nature in the medical field, whereas they were laced with revolutionary and critical theoretical ambitions at Roskilde. But conditions at Roskilde rapidly changed, and the revolutionary ambitions of the most radical elements crashed against government resistance, popular suspicion of left-wing ideas spurred on by the press, and student and teacher weariness. Around this time, more pedagogical ideas on the nature of problems emerged from the work of Knud Illeris:

Det helt centrale ved den problemorienterede undervisningsform er, at udgangspunktet ikke tages i de gennem traditionen udviklede fag, hvis konstituering ligger langt tilbage i fortiden og var betinget af for længst forsvundne samfundsforhold – men derimod i foreliggende problemer, der findes her og nu, og i hvis behandling de forskellige fags viden, metoder og teorier inddrages i det omfang, det netop ud fra den pågældende problemstilling er relevant. Problemorientering er som et grundlæggende didaktisk princip nært beslægtet med velkendte undervisningsprincipper som induktiv tilrettelæggelse og de især i amerikansk læreplansudvikling meget omdiskuterede 'opdagelses'-metoder (discovery methods). Men problemstillingen adskiller sig afgørende fra disse principper ved som udgangspunkt at forudsætte en op hævelse af fagene som konstituerende for undervisningen mens der ikke i principperne om induktiv tilrettelæggelse og 'opdagelses' metoder ligger nogen stillingtagen til dette forhold – og disse principper

⁸¹¹ Arthur Kaufman. *Implementing Problem-Based Medical Education*. (New York: Springer Pub. Co. 1985).

⁸¹² Evidenced by a roster in the invitation to the 3rd General Annual Meeting of the Network, held in Cuba in 1983. Network of Community-Oriented Educational Institutions for Health Sciences. 'List of institutions / organizations invited to the third general meeting of the Network of Community-Oriented Educational Institutions for Health Sciences on July 1 and 2, 1983, in Havana, Cuba.' Memorandum from March 21, 1983. Private Collection H.G. Schmidt. Erasmus University, Rotterdam.

⁸¹³ The interested reader will be able to find an overview of some of the community-oriented achievements of The Network in Zohair M. Nooman, Henk G. Schmidt, and Esmat S. Ezzat. *Innovation In Medical Education*. (New York: Springer Pub. Co., 1990), 247-300.

kan ses i praksis helt overvejende at være tænkt og anvendt inden for the traditionelle fags rammer. Fx forudsætter begrebet fagdidaktik, der indgår som en helt central kategori i den traditionelle didaktik (jvf. Klafki 1963, C.A. Larsen 1969), netop principielt fagene udgangspunktet. Megen progressiv pædagogik er tænkt og udviklet inden for fagdidaktikken, men i selve udgangspunktet ligger en principiel begrænsning, der umuliggør egentlig problemorientering, sådan som dette princip her er defineret.⁸¹⁴

We note here the reference to Bruner's learning by discovery, something that would have been unthinkable in the context of *fagkritik*. Certainly, the central theme of the problem was still the transcendence of disciplinary boundaries, but the emphasis was not so much on social change. Problem-orientation seen from this perspective was a relevant way of organizing learning rather than a means of revolutionary social transformation. This definition did not require, to be effective, that the problem be specifically societal or be tackled through *praxis*, only that it be interdisciplinary and allow for the induction of more general principles from the specific problem case (exemplarity). Surely, this definition would not be so out of place in a manual from McMaster or Maastricht! We note in this definition of problem orientation the absence of 'skills' of any kind, 'learning to learn' or other process-oriented ideas. In this sense, Illeris' ideas on problem-orientation might be more closely aligned with Schmidt's definition of problems than Barrows'. This is hardly surprising, considering that both Schmidt and Illeris held Piaget, Bruner and constructivism as the cornerstones of their educational theories. Such a definition opened the door for the redefinition of problems as pedagogical tools both at Roskilde and Aalborg. Whereas Roskilde went through this reinterpretation rather reluctantly, Aalborg embraced it as more fitting to their programme, particularly in engineering, as expressed by Anette Kolmos:

There may be a contradiction between what is experience-based and socially relevant and what is relevant to the educational objectives. In scientific and technical education it may be very difficult to practice a problem orientation of that kind, but in humanities and social sciences also, investigations at Aalborg University show that problem orientation can only be interpreted in the sense that the problem ought to determine the project. Thus, in reality, problem orientation has transformed into topic orientation.⁸¹⁵

What exactly does this mean? The best way to illustrate it is to list a sample list of problems used as project titles at AUC between 1974 and 1976:

⁸¹⁴ Illeris, *Problemorientering og deltagerstyring*, 81-82. Translates as: The central point of problem-oriented teaching, is that its starting point cannot be found in traditionally developed disciplines because their foundations lie in the past and are conditioned by long-gone conditions in society. In contrast to this, the work of the future is related to present problems, in which the work with different disciplinary knowledge, methods and theoretical viewpoints is taken into consideration, as it is relevant for the actual problem. Problem-orientation is, as a fundamental didactic principle, closely related to the well-known teaching principle of inductive organization – especially in the American 'discovery methods'. But the problems differ in an important way from those principles as they require as a starting point the transcendence of the disciplines as the constituting point of teaching. This American principle can be seen in practice as thought and applied within the boundaries of the disciplines. For instance, it focuses on subject-based didactics as the central point. A lot of progressive pedagogical thought has developed inside the boundaries of the disciplines, but given its starting point, this makes it incompatible with the principles of problem-oriented work as defined here.

⁸¹⁵ Kolmos, 'Reflections on Project Work', 142.

Faculty	Theme	Project Title
Language & Pedagogics (Humanities)	Education & Teaching	Project 1: Children in Kindergartens Project 2: Relationship between language & cognitive development and attitudes about education. Project 3: Reading books & connection with reality, a research into 5th grade reading books. Project 4: Investigation of socially relevant radio programmes for 7th graders. Project 5: Language and teaching in evening schools.
Social Sciences	Unemployment in relation to the crisis / Violence in society/ Democracy, ideology and reality	Project 1: Criminal acts' influence of a family's situation. Project 2: Family and the public sphere's function as socialization factor. Project 3: Treatment possibilities in connection with different social events for low-income families. Project 4: Youth crime. Project 5: Disabled pensioners.
Engineering (Technical & Natural Sciences)	The 'house' (building), its surroundings, form, function, constructive design.	Project 1: Sports hall at a school (South East Aalborg) Project 2: Technical, vocational school in Aalborg East Project 3: Swimming pool in school in a village outside Aalborg. [For each of these they have to propose an analysis of surroundings, form, function and design]

Table 15: Sample Project Themes and Titles at AUC 1974-1976⁸¹⁶

The first remark is that these problems do not comprise any *a priori* social revolutionary elements (although some could be interpreted as such). The TekNat problems, more than the rest, are very much oriented toward the resolution of practical problems, such as the construction of a swimming pool in a village outside Aalborg. Secondly, these problems have far shorter descriptions and paradoxically far broader possibilities for interpretation than the sorts of problems used at Maastricht or McMaster, as we can see by comparison:

A man aged 35 years suffers a compression fracture of his lumbar injury, he develops pain in his left calf. Clinical examination suggests a deep vein thrombosis (D.V.T.) 2 days after symptoms attributed to D.V.T. had become manifest the man experienced onset of sharp pain just below the right axilla and aggravated breathing (Pleuritic pain). Cough developed with altered blood present in sputum.
Analyse the above events in terms of possible cellular, tissue, organ and whole body response. Suggest rational therapeutic approaches.⁸¹⁷

Whilst the above problem may not have only one angle of approach or only one set of possible learning goals, the subject matter is still carefully restricted to ensure that it does not exceed students' prior knowledge. Being more restricted, the problem is suited for a shorter problem-cycle, ranging from several days in Maastricht to a month at McMaster. By contrast, the problems in the Aalborg list could be approached from a very broad range of disciplinary angles, using a plethora of theoretical models, including empirical data collected by the students themselves as well as an understanding of relevant literature. That said, these problems were not a free-for-all; the themes selected by the faculty provided some basic guidance for

⁸¹⁶ Aalborg Universitetscenter Aarsberetning [Annual Report], (Aalborg: Aalborg Universitetscenter, 1976), 97.

⁸¹⁷ T.J. Muckle, 'Phase II 1971-1972, Unit 2, Ischaemia', student unit guide from 1971 retrieved from G.R. Norman's personal files, McMaster University, Hamilton, ON.

students. But ultimately whilst Maastricht students were confronted with a problematized situation from the outset, Aalborg students were required to problematize it themselves.

This brings us to the final and most important point about the nature of problems, the elephant in the room of PBL: in the McMaster and Maastricht idea of PBL, the problems were written as knowledge activation triggers by one or several subject-matter experts. These problems, ranging from a couple of lines to several pages, were handed over to the students who formulated questions, or learning objectives, after an intensive analysis of the text, images, schematics, patient simulation or other triggers provided by the Faculty. Certainly, the students had some liberty (at least in theory) to choose the learning goals that seemed most relevant to them based on the problem triggers, but their learning process was steered to a large extent by the problem. This gave the content experts a much larger control over the direction the students might take, as pointed out by Schmidt.⁸¹⁸ In Maastricht and McMaster the belief was that students lacked the necessary background knowledge to know which problems were relevant to their studies – and it was particularly important that they did study the right problems because at the end of the day, people’s lives depended on their proper training as doctors. In the Aalborg model of PBL, the problem was formulated by the students, based on themes given to them by content experts. Student would get together in groups and decide, based on the theme, which problem they wanted to tackle for their project. *Fagkritik* was not as important at Aalborg so the key to understanding the difference in problem formulation (experts v. students) between Aalborg and Maastricht could be the light of Illeris’ interpretation of Piaget as a justification for participant direction. Illeris anchored his argument in the line of thought of progressive pedagogy, from Dewey to Piaget. In summary, he claimed that unless a problem was truly a problem to the student, he would not be interested in addressing it, and would instead seek shortcuts to obtain the desired grades and please teachers. In this case, Illeris argued, learning would be merely accumulative, or perhaps assimilative. The only way to ensure true learning was to spur accommodative learning. Being a difficult and uncomfortable process, this could only occur when the learner was truly invested in the problem at hand. Thus, for real learning to take place, the learner had to be let to formulate the problem that would interest him enough to truly learn.⁸¹⁹ It would however be a mistake to interpret Illeris as saying that teachers should be kept out of the equation. Note that his book was titled ‘participant direction’ and not ‘student-direction’. This is because Illeris saw the teacher as an equal participant in the process. Thus, the problem was formulated in equal part by the students and the teacher, ensuring that students did not wander in impossible directions or select problems that would not lead to significant learning.⁸²⁰

After carefully studying the historical evidence, we can conclude that the nature of problems in the McMaster and Maastricht model differed quite markedly from those at Roskilde and Aalborg – in their purpose, their form and their formulation. Problems at Roskilde also differed to a smaller degree from those at Aalborg, principally because the former had a stronger social orientation than the latter, which tended to be more practical particularly in the technical and

⁸¹⁸ Schmidt, ‘Probleemgestuurd onderwijs en projectonderwijs’, 42-45.

⁸¹⁹ Illeris, *Problemorientering og deltagerstyring*, 82-84.

⁸²⁰ Illeris, *Problemorientering og deltagerstyring*, 85.

natural sciences. What this means is that one does use the appellation ‘problem-based learning’ for both the McMaster-Maastricht model and the Aalborg model, one must do so with the understanding that the meaning of ‘problems’ is quite different in either case. One might argue, as Kolmos and De Graaff did, that this difference is purely down to disciplinary imperatives but given that Donald Woods from McMaster’s engineering department was more or less successfully using the McMaster method in his course in chemical engineering in the 1970s, this would be an unlikely explanation.⁸²¹ The fact that the Faculty of Economics of Aalborg uses problem-oriented project based-learning whilst the Faculty of Economics of Maastricht University uses the method borrowed from the medical school also indicates the difference in the understanding of problems probably lies in the models’ historical path-dependency rather than the constraints of particular disciplines. Nonetheless, it may be that similarities in the learning process are strong enough to outshine the differences in the problems. Thus, we shall proceed by comparing nature of the educational process in PBL and project work.

On the nature of the educational process

The question of comparing the learning process in PBL and project work has two components, that we shall call external and internal. By external we mean the process that takes place in the classroom – the arrangement of students in groups, the role of the teacher, the place of literature and self-study etc. By internal we mean the process that takes place in the head of the student, thus, from a cognitive psychological perspective. While the first is of organisational importance and therefore answers to Schmidt’s argument for separation, the second is of philosophical importance and answers to Kolmos’ claims that the learning principles are comparable. We shall begin by tackling the first issue briefly by comparing the evolution of group work, courses and teacher roles at Roskilde, Aalborg and the McMaster-Maastricht PBL model. We will then move to a conclusion on the issue of the assimilation of all models of problem-oriented education under the ‘PBL’ umbrella.

Small Groups

The idea for the new forms of education at RUC and AUC began with the same complaints about the traditional education process as had been voiced by Evans and his colleagues: under the old ways, one would be swimming the marasmus of large lecture halls and bored stiff by pontificating professors, and this was simply inadequate for the 20th Century. Astroth noted, in 1973:

Many complaints had arisen in large universities that the individual had a tendency to be lost in the crowd; that students in large multi-universities became mere cogs in a machine. In an attempt to remedy this growing situation, Roskilde’s physical structure was created in the form of social unites (sic) with which the individual student was able to identify.⁸²²

⁸²¹ Donald R. Woods, ‘Issues in Implementation in an Otherwise Conventional Programme.’ In *The Challenge of Problem-Based Learning*, ed. David J. Boud and Grahame Feletti (New York: St. Martin’s Press, 1991).

⁸²² Astroth, ‘Roskilde University – Observations’, 9.

The answer was to strip the professor of his lecture hall and hand power to small groups of students who would learn not by being told but by experiencing problems first hand. According to Salling Olesen, the small group format would prevent individualistic ‘ego-tripping’ on part of students, stressing instead decision making based on argument and reason.⁸²³ The physical representation of this change of educational process was in the shaping of learning spaces as small group rooms, rather than massive halls. Just as McMaster’s programme had enshrined group-work in its constitution under the leadership of Evans and Spaulding, so the programme of Roskilde was also devised:

Work should typically take place as group-work and the students should develop the ability of tackling problems scientifically (learning-by-doing research). The work of the group should follow the principle of collective direction, in as much as the teacher is conceived to be a participant in the project, planning and execution of the work should therefore be done by the participants collectively.⁸²⁴

At Roskilde this idea was transposed into the ‘House’ system and featured as a centre piece both student life and the physical structure of the campus.⁸²⁵ The principle of small-group work was adopted wholesale by AUC, although they did not transpose the idea of the ‘House’ and instead opted for ‘*Storgruppe*’ (large group), which, although they did not quite have the physical structure of the RUC Houses, practically amounted to the same thing; each *storgruppe* comprised 96 students, 8 teachers and a secretary, divided a number of project groups of usually 6-8 students each with their own room equipped with a typewriter, printer and other necessary group-work facilities.⁸²⁶

We explained in Chapter 1 how small groups also came to feature as a centrepiece of McMaster’s programme, comprising as few as 5 students per group in its early days. That ideal is long gone due to financial constraints, with the norm in PBL groups around the world now around 8-12 students per group, with some groups up to 15 or 20 students.⁸²⁷ The project model at RUC and AUC did not lay specific conditions for group numbers, but the average was around 6-8 students and it appears this remains the norm today.⁸²⁸ Maintaining such small group numbers in the face of massively increasing student intakes did have financial implications and may explain why so many project supervisors began to feel their supervision time stretched thin after the 1970s.⁸²⁹

One notable difference in the format of small-group work is that on the one hand McMaster, Roskilde and Aalborg did not tend to structure the times at which the groups would meet whereas on the other hand Maastricht provided a strict schedule for tutorials. At Maastricht, the group could of course meet outside of those hours amongst themselves, but the tutor would

⁸²³ Hansen, *En Koral I Tidens Strøm*, 43-44.

⁸²⁴ Beyer, ‘On The Development Of The Idea Of Project-Organization’, 2.

⁸²⁵ See above in Illeris, ‘The Organization of studies at Roskilde University’, 19.

⁸²⁶ *Aalborg Universitetscenter Aarsberetning*, 95-96.

⁸²⁷ Jos H.C. Moust, Henk J.M. van Berkel, and Henk G. Schmidt, ‘Signs of Erosion: Reflections on Three Decades of Problem-Based Learning at Maastricht University’, *Higher Education* 50, no. 4 (2005): 665–83.

⁸²⁸ *Aalborg Universitetscenter Aarsberetning*, 95-96. The provisions allowed students to do a project on their own if they so wished, but this was discouraged.

⁸²⁹ Dahms, in interview with the author, January 14, 2013.

not be present, whereas Jim Anderson described a McMaster tutorial meeting as organised with the tutor at the request of students, much like in the Roskilde ideal.⁸³⁰

This said, even though all four schools studied here featured small group work as a core component of their educational process from the outset, the two Danish institutions took this principle one step further by turning the end-of-project examinations into a group affair too.⁸³¹ Indeed, students at both RUC and AUC would have to hand in their project report and then present their findings together thus obtaining one grade (pass or fail) for their work as a group.⁸³² The group examination marked a major difference with the practice at McMaster and Maastricht: having eight aspiring doctors show up for their LMCC at the same time, or doing their Progress Test together would have been quite unthinkable!

In conclusion, the organization of learning into small groups may well be one of the features that brings the four models closest together. This is not surprising as these models were constituted as a 1970s rebellion against the patriarchal authority of professors. However if small group work was the constituting feature of PBL, by that token all small-group activities should be considered PBL, including team-based learning, case-based learning, the jigsaw method and so forth.⁸³³ Since this suggestion is absurd from a historical, philosophical and organisational perspective, then small-group work can at best only be considered a necessary but not sufficient condition of PBL.

Courses and lectures

One of the key principles of the McMaster programme was that lecturing would only be done in exceptional circumstances. The reader will recall that the Education Committee drew up a list of seven educational formats in 1967, and noted of lectures:

Large group - reserved for a few important occasions a) a useful visitor who has much to offer but no other method of communication b) the presentation of organized information in concise form on a complex subject. Time saving is the goal. c) a change of pace when other techniques are wearing thin.⁸³⁴

Therefore lectures were a very limited part of the programme, which was centred on self-directed learning triggered by problem discussions in tutorials. Neither McMaster nor Maastricht ran any traditional courses alongside their problem-based programme: whatever

⁸³⁰ Anderson's imaginary diary of a McMaster student, cited in William B. Spaulding, *Revitalizing Medical Education, McMaster Medical School the Early Years 1965-1974* (Hamilton, ON: B.C. Decker Inc, 1991), 43-46.

⁸³¹ Klemmensen, 'Sølvbryllup I oprøret', 39.

⁸³² *Aalborg Universitetscenter Aarsberetning*, 97.

⁸³³ Team-based learning is a method of group work developed by Larry Michaelsen in Oklahoma in the 1970, Larry K. Michaelsen, Arletta Bauman Knight and L. Dee Fink, *Team-based learning: a transformative use of small groups* (Westport, CT: Praeger, 2002), vii. Case-based learning refers to the classic Harvard Method by Analogy (see Chapter 2 of this treatise). The Jigsaw Method is a form of collaborative peer-learning developed by Elliot Aronson in the 1980s, Elliot Aronson and Alex Gonzales, 'Desegregation, Jigsaw and the Mexican-American experience'. In *Eliminating Racism*, ed. Phyllis E. Katz and Dalmis A. Taylor (New York: Springer, 1988).

⁸³⁴ Education Programme Committee. 'Phase I Programme: 1969'. Memorandum from 1968. Educational Programme Committee - 1966-1967 - HHS/ FHS Archives, Box 232.4;1. McMaster University, Hamilton, ON, 3-4.

students had to find out should be available from the study materials or experience in the *Skillslab* and other sources of applied knowledge.

In theory, in the earliest days of its basic education programmes, Roskilde would have offered a similar model, with problem-oriented project work as the default mode of study and courses as ‘auxiliaries’ to the projects (in the words of the DSF) as and when students requires them.⁸³⁵ But from the outset natural sciences, being deemed too difficult to handle without supporting theoretical instruction, was offered an exemption to this principle and project work was reduced to 50% of study time, with the rest filled by traditional courses.⁸³⁶ According to Astroth, in 1973, it was still the case that lecturing was a marginal activity reserved for cases where students felt some theoretical explanations might help: ‘teachers at Roskilde do not lecture (except in the exceptional case of courses in the natural science as mentioned) and are used as references by students when they feel it necessary’.⁸³⁷ However, around 1975, as pressure mounted and tensions between the university management and the ministry of education came to a high, Ritt Bjerregaard, the minister of education, appointed *ad hoc* boards to reorganize RUC’s basic education programme, and that meant doing away with the projects as the sole basis for learning and introducing regular courses alongside projects.⁸³⁸ According to Hansen, by the 1980s, after the long and protracted dispute with the government had worn thin, disciplinary inputs alongside project work had become the norm.⁸³⁹ The 50/50 share of project work and regular courses that emerged from this period is still practiced today. Interestingly, the 50/50 debate was never an issue at Aalborg, where the division was accepted from the outset and included in the university planning proposal.⁸⁴⁰ Of these 50% of course time, half were allocated to courses specific to the projects and the other half to general theory courses. It seems this approach was quite popular, since, as Kjærdsam and Enemark noted from a student evaluation: ‘the balance with 50% project work, 25% project-oriented courses and 25% general courses was assessed as perfect’.⁸⁴¹ Despite this positive assessment from 1994, Aalborg reformed its curriculum in 2010 such that all traditional courses are now independent from the project, thereby moving the emphasis farther away from the problem-projects and closer to disciplinary knowledge transfer.⁸⁴²

What we can conclude from this is that while the Roskilde study format would originally have been closer to the *modus operandi* of McMaster and Maastricht in their commitment to problem-orientation as the sole guide to learning, the later Roskilde model veered decisively in the direction of a more strongly teacher-guided process with the insertion of the 50% lectures rule. Certainly, when it comes to Aalborg, the question of letting the entire curriculum be determined by problems was never on the cards. Thus, if the ratio of lectures to small-group

⁸³⁵ Hansen, *En Koral I Tidens Strøm*, 43.

⁸³⁶ Hansen, *En Koral I Tidens Strøm*, 67.

⁸³⁷ Astroth, ‘Roskilde University – Observations’, 11.

⁸³⁸ Hansen, *En Koral I Tidens Strøm*, 135-136.

⁸³⁹ Hansen, *En Koral I Tidens Strøm*, 245.

⁸⁴⁰ See for instance *Aalborg Universitetscenter Aarsberetning*, 97.

⁸⁴¹ Kjærdsam and Enemark, *The Aalborg Experiment*: 11.

⁸⁴² Bettina Dahl, Jette Egelund Holgaard, Hans Hüttel and Anette Kolmos, ‘Students’ Experiences of Change in a PBL Curriculum’, *International Journal of Engineering Education* 32, no. 1(B): 384-395.

problem-work were to determine the sort of PBL that one ends up with, then according to Kwan and Tam's classification of PBL curricula from 2009, the pre-2010 Aalborg would best fit the 'type III Hybrid PBL' model, and some might argue that the post-2010 Aalborg moves a step closer to a 'type II Hybrid PBL'.⁸⁴³ That said, Kwan's typology was built to fit PBL programmes spawned of the McMaster and Maastricht variety, therefore the fit with Aalborg is far from perfect and provides an unsatisfactory description of a programme with such a long, rounded history of using problem-oriented projects. Unfortunately, this sort of descriptive equivocation does tend to happen when one insists on comparing apples and oranges on the principle that they are both fruits.

Teachers

The final point to consider in the comparison of the educational process in the four models is the role of the project supervisor compared with the role of a PBL 'tutor'. The role of a *vejleder* was a rather fuzzy construction both at Roskilde and Aalborg. Much as the definition of project was left open, so was the role of the teachers, which meant that each basic education programme developed its own set of practices in this regard. All agreed that the teacher should no longer be the almighty professor he had been at Copenhagen University, but not all agreed on where he should go from there.

It is evident from the writings of Illeris that supervisors were considered one of the participants in the project work, alongside the students; what's more, teachers were expected to set the criteria for problems to ensure that these would meet the requirements for accommodative learning.⁸⁴⁴ Berthelsen, Illeris and Poulsen said of the teacher role: 'Læreren tilrettelægger de ydre rammer og konfronterer til stadighed eleverne med undervisningens overordnede mål' – giving the teacher a sort of mediating role between the educational institution and the students' learning.⁸⁴⁵ In the social sciences, the teacher was defined as a consultant to be called upon as the need arose, whether for methodological or content support.⁸⁴⁶ But pinpointing the pedagogical implications or precise function of this role in humanities and social sciences was rendered problematic by the large influx of left-leaning and critical teachers who saw their role more from a social-revolutionary angle than from the perspective of progressive pedagogy.⁸⁴⁷ The problem with this revolutionary stance was that it actually lacked theoretical content, academic or pedagogical depth, as pointed out by Bent Rold Andersen at the time.⁸⁴⁸ This merely translated into political trouble-making instead of a concrete direction for a radical rethinking of teaching beyond disciplines. Klemmensen noted of the role of teachers at RUC in the 1970s that the latter did not have the required experience in the content of the studies or the political sphere to develop the foundations of this new model of education and make these

⁸⁴³ Kwan and Tam, 'Hybrid PBL-What Is in a Name?', 221.

⁸⁴⁴ Illeris, *Problemorientering og deltagerstyring*, 82-85.

⁸⁴⁵ Berthelsen, Illeris and Poulsen, *Projektarbejde*, 19. Translates as: 'The teacher organizes the external environment and confronts students continually with the overall learning objective'

⁸⁴⁶ Roskilde Universitetscenter, 'Betænkning Om Samfundsvidenskabelig Basisuddannelse'.

⁸⁴⁷ Hansen, *En Koral I Tidens Strøm*, 37.

⁸⁴⁸ Hansen, *En Koral I Tidens Strøm*, 45.

concretely accessible to the students.⁸⁴⁹ Instead, their time had to be used in fighting off political pressures. In other words: in the face of the political storm, pedagogics and theory came second.

Despite its more pragmatic orientation, Aalborg did scarcely better in defining the supervisor role in its early days. With the influx of teachers from pre-existing institutions, it had to contend with experienced teachers attached to their traditional ways, a few new radicals of the Roskilde calibre and young recruits with no idea about project work. By the time the university opened, the planning body still had not decided on the extent to which the project should be framed by the teachers or students, on the distribution of teacher-centred and student-centred activities and on the qualifications expected of incoming teachers.⁸⁵⁰ During the 1970s, pamphlets emerged explaining that the role of the supervisor was that of a participatory co-worker in the project, but in practice, in the first ten years at least, the role of the supervisor tended to emerge as a social construction in relation to and dependent on the students, colleagues and the institutes in which supervisors would operate.⁸⁵¹

Given the blurred nature of the *vejleder* role, what can we say to offer a fair comparison with the McMaster and Maastricht tutor? The first point is that the scope of the supervisor role could be much broader than that of the PBL tutor. Indeed, the PBL tutor at both McMaster and Maastricht primarily played the role of a process guide, a more (McMaster) or less (Maastricht) knowledgeable mediator during group meetings. Outside of meeting, students were expected to reach out to resource persons rather than their tutors (although, as we have seen, they rarely did so). The project supervisor at Roskilde and Aalborg could be a process guide, but also a methodological expert, a content resource person or somebody who could facilitate contacts with the outside world. The role was as versatile as the nature of project work would allow, and it is probably because of the very fluid nature of project work that the supervision role lacked the steadfast rules that seemed to accompany tutoring at Maastricht.

The issue of content expertise was not a defining differentiator between the medical PBL model and the Danish model; firstly because McMaster did not share Maastricht's aversion to content experts, and secondly because supervisors in the Danish model were often not experts in the topic of the projects which they were supervising, as explained by Palle Rasmussen, who acted as a supervisor for the Humanities:

You were expected to be able to move beyond your narrow specialisation and look into things. It means, and also meant that very often you drew very much on your methodological skills in order to help students. This is one experience that many of us had when we started this: because a group of students working seriously on a project, they actually acquire a lot of knowledge so the situation could be that you started with a group and you begin the supervision, and then a month later, they know more about the subject than you did. But you could still use your skills in argument, methodology, working with theory, things like that, to help their work advance.⁸⁵²

⁸⁴⁹ Klemmensen, 'Sølvbryllup I oprøret', 51.

⁸⁵⁰ As explained in Servant and Spliid, 'Teacher roles at Aalborg', forthcoming.

⁸⁵¹ Ibid.

⁸⁵² Palle Rasmussen, (*former DSF member involved in the setup of Roskilde and Aalborg Universities*) in interview with the author, January 11, 2013.

This said, it could be argued that supervisor subject expertise was more important in the natural and technical sciences, as explained by Anette Kolmos from an engineering perspective:

[Supervisors] are experts. And we actually make a point out of it. Looking at the Maastricht model where they have been more process-oriented, we say that supervision is not supervision in the American sense, where you are a superior, deciding on, or controlling your students. It's more in the way of facilitation. The Scandinavian term... in Swedish, it's called: *handledning*. It means that with your hand, you are directing. Here, it's called *vejledning*, in Danish, and it means that you are showing the road, you are showing the direction, somehow. So but it doesn't mean that you are deciding. So it's a soft way of supervising. And what we are saying is that we should not lose our expertise role. We are experts within our field. We are not telling the students what to do and what not to do. Our expertise is that we can give the students opportunities. So they have to discuss in which direction they are going. So we are expertly facilitating the students. This is our conceptual understanding.⁸⁵³

This particular understanding of expertise in supervision is not so different from the way McMaster tutors were expected to handle expertise. This is a Deweyan interpretation of the teaching role, which, while not in line with the Maastricht school of thought, is by no means incompatible with the principles of PBL.

Finally, both the PBL tutor role and the *vejleder* position shared a commitment to student-centred learning, and neither was expected to teach in the traditional sense. As the former Rector and Dean of the AUC Faculty of Engineering stated:

At the end of the day the students decide which problem they will work on, who they will work together with and they get a supervisor and if the students think it's good enough, the supervisor can't change that but he can advise them, say "I think this is good enough" or "there is another mainstream theory you have not looked at". But it is the students which make the decisions. The students which write the project, the students which defend it on the examination.⁸⁵⁴

This sort of statement could just as well have come from the mouth of Jim Anderson. It is true that Maastricht structured the role of its tutors far more than Roskilde or Aalborg did, but then Maastricht may well have been on the more structured side of the spectrum for any PBL programme. McMaster certainly did not have the sort of rules, procedures, guidelines and training programmes that Maastricht used for its tutors.

In summary, the role of the PBL tutor and project supervisor are similar in the sense that they are focused on student guidance and support rather than knowledge transfer, authority and process-direction. The role of content expertise is a contested issue in both models and therefore does not differentiate one model from the other. There is however a difference in the scope of the roles – the role of the PBL tutor being far narrower and with a smaller margin of interpretation than the role of the project supervisor. It must however be remembered that while PBL students will generally have little contact with professors and lecturers other than as tutors, half of the students' contact time at Aalborg is with lecturers in a lecture setting, which gives a rather different dynamic to the learning process. In conclusion, while it is certain that PBL requires the presence of a guiding figure to help the student group in the learning process,

⁸⁵³ Kolmos, in interview with the author, 2013.

⁸⁵⁴ Kjærdsdam, in interview with the author, 2014.

interpretations of the precise role of tutors and supervisors vary too wildly to be called in to arbitrate in the question of what defines PBL as a method.

We have now compared the nature of problems, the role of small groups and the format of projects and courses and the role of teachers and concluded from the historical-empirical evidence that there are very large differences indeed in the organisational principles of PBL at McMaster and Maastricht and project work at Roskilde and Aalborg. We shall offer a recapitulative comparison of the four programmes before drawing conclusions on question of the appellation 'PBL', which will allow this chapter to close on the argument that self-direction and its educational implications forms the backbone of both models.

PBL and Project Work: two sides of a same coin?

All born in the five years that followed the student movement of 1968, the first two PBL programmes at McMaster and Maastricht and the two Danish reformed universities at Roskilde and Aalborg were revolutionary in their own way in their own context. Despite their distinct history and educational development, in the 1990s Aalborg adopted the term 'PBL' that had been coined by Barrows and Neufeld to describe McMaster in 1974.⁸⁵⁵ This treatise has been attempting to answer the question: can the models all fit under the umbrella appellation of 'PBL' or should a distinction be drawn between the PBL models issued from McMaster on the one hand and the Aalborg model on the other? The following table summarizes our findings up until this point:

⁸⁵⁵ Victor R. Neufeld and Howard S Barrows, 'The 'McMaster Philosophy': an Approach to Medical Education', *Journal of Medical Education* 49 (1974): 1040–50.

CHAPTER 5: THE DANISH PROBLEM-ORIENTATION REFORM

	McMaster	Maastricht	Roskilde	Aalborg
Year of entry first cohort	1969	1974	1972	1974
Historical reasons for reform	Unhappy with old ways.	Political decision to justify building 8 th medical faculty	Defy traditional authority, social revolutionary considerations, some pedagogical considerations	Defy traditional authority, improve engineering education.
Role of teachers	Tutors no longer lectured, process-focused, but still acted as group leaders.	Tutors no longer lectured, process-focused, did not have to be content experts, students were group leaders.	<u>In projects (50%)</u> Teachers seen as equal members of the group, as methods & content resource persons for students. <u>In courses (50%)</u> Lecturer	<u>In projects (50%)</u> In principle same as Roskilde but some tension with teachers coming in from traditional institutions. <u>In courses (50%)</u> Lecturer
Education format	<u>Mainly:</u> small-group tutorial. <u>Also:</u> Guided instruction, developmental discussion, field trip, self-learning, lecture, recitation.	Small-group tutorials <i>Skillslab</i> Field work.	<u>1972-75:</u> 100% project-work in Soc Sci. & Hum. 50% project v. 50% courses in Nat. Sci. <u>After 1975</u> 50% project work 50% courses	<u>Before 2010</u> 50% project work 25% project courses 25% courses <u>After 2010</u> 50% project work 50% courses.
Group size	Small groups	Small groups	Small groups 50% Large groups 50%	Small groups 50% Large groups 50%
Origin of problems	Given by faculty	Given by faculty	Formulated by students based on themes	Formulated by students based on themes
Problem structure	<u>1969-1977</u> Biomedical problems <u>1977-1993</u> Socially relevant medical cases <u>1993-Present</u> Biomedical problems	Biomedical problems Social problems Medical cases	Social problems Real-life problems	<u>Hum & Soc Sci</u> Social problems real-life problems <u>Tek-Nat</u> Real-life problems Technical problems
Problem cycle	Short	Short	Long	Long
Problem deliverables	None	Group problem report (ungraded)	Group project report (graded)	Group project report (graded)
Interdisciplinarity	Some attempt to do away with traditional medical disciplinary divisions.	Some attempt to do away with traditional medical disciplinary divisions, but neither explicit nor important.	Central to the model. Attempt to go beyond the disciplines failed in the late 1970s. Model changed to ‘multidisciplinary’ in 1980s.	Initially central to the model, but progressive return to disciplines in the 1970s.
Importance of social concerns	Some, but never really played out in the curriculum.	Some, initially important for founding Dean but less prominent later.	Central to the model.	Central to the model in social sciences, less in technical & natural sciences.

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Importance of training professional skills	Somewhat important, although 'skills' training didn't come in until the late 1970s.	Very important, invention of the <i>Skillslab</i> .	Not important, technical sciences deliberately excluded.	<u>Hum & Soc Sci</u> Not v. important <u>Tek-Nat</u> Very important
Importance of political concerns	None	None	Central to the model.	Some in the beginning, quickly fading.
Assessment	Initially only peer-evaluation. Then introduction of 'Triple Jump'. <u>1993</u> Introduction of Progress Test.	Block tests Progress Test (individual)	Group exams based on project group. Initially no course exams, later individual exams for courses.	Group exams based on project group. Individual exams for courses.
Disciplines of model application	Medicine & Health Sciences	Medicine, Health Sciences, Law, Economics, Psychology, etc.	Humanities, Social Sciences, Natural Sciences.	Humanities, Social Sciences, Technical & Natural Sciences.

Table 16: Comparative features of McMaster, Maastricht, Roskilde and Aalborg educational models

Based on the content of this table and the arguments laid out in the preceding sections, we can draw some conclusions on the historical, philosophical and organizational principles of PBL.

Historical discrepancies

Although all four models were the children of the social-revolutionary movements of the 1960s, which put educational reform on the agenda and the overthrow of traditional professorial authority on the cards, the historical similarities stop there. Neither knew about the other until the 1990s, and each was embedded in its own particular context: McMaster in the context of the renewal of medical education in North America, Maastricht in the context of the closure of coalmines in Limburg, Roskilde in the context of the Danish student revolts, and Aalborg in the context of the regional development of Northern Jutland. To see in the temporal proximity of these universities' founding a globalised 'reformed universities' movement is a teleological fallacy that does not correspond with historical evidence. Therefore, the historical argument for joining PBL and project work can be dismissed out of hand.

Intellectual cross-overs

Despite their distinct historical background, the four models did bathe in the intellectual waters of the 1960s and 1970s. Unsurprisingly, therefore, names like Dewey, Rogers, Bruner, Piaget and Vygotsky have appeared time and again in this treatise. We can summarise their influence on the four models as follows:

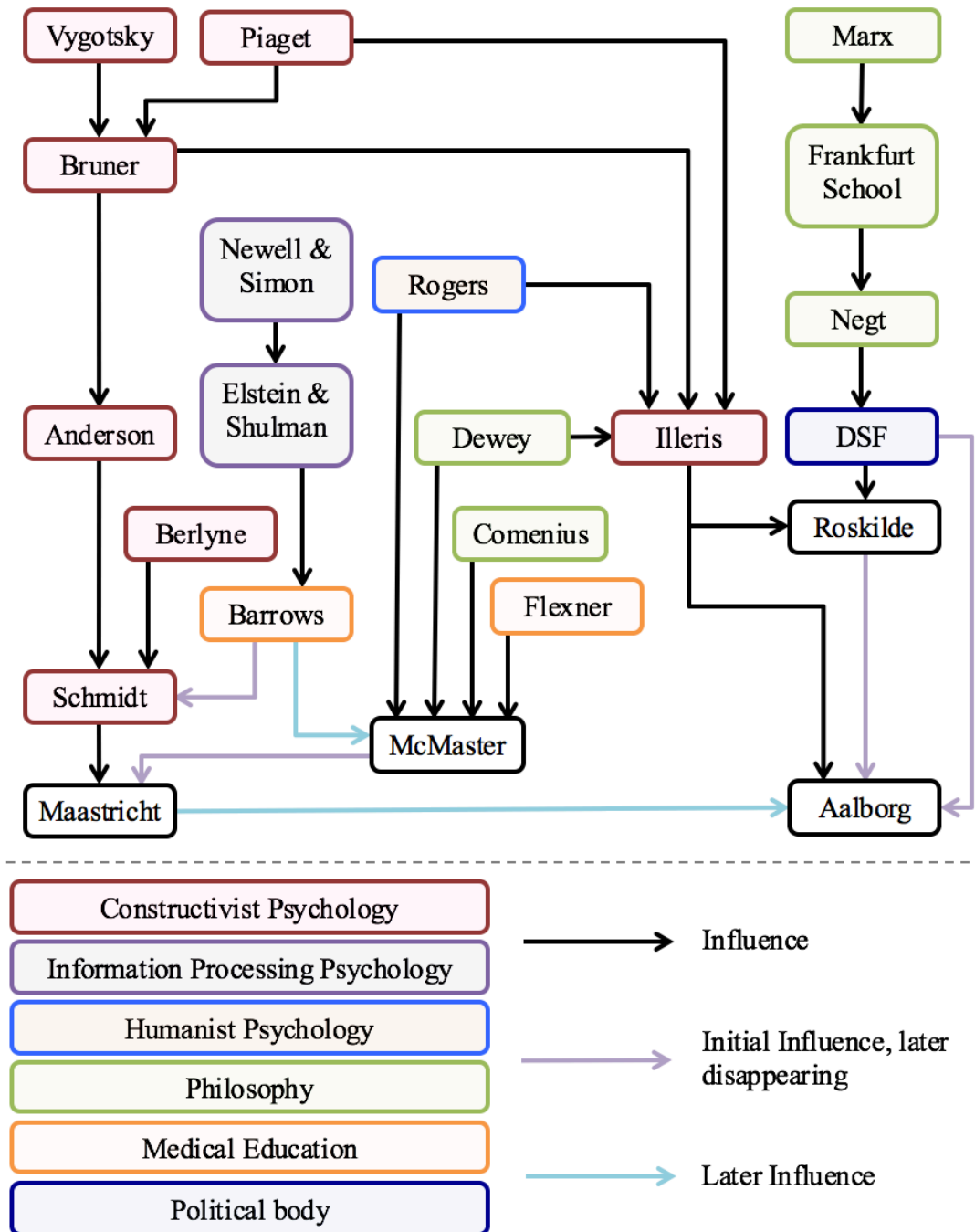


Figure 11: Historical Tree of Intellectual Influences in Problem-Oriented Education

From this schematic, we can conclude the following:

- a) There was **no overarching reference** employed by all four programmes studied in this chapter, but each programme had at least one intellectual influence in common with one of the others.
- b) Maastricht was most strongly influenced by constructivist psychology, Roskilde by (Marxist) philosophy and McMaster and Aalborg by a broader range of influences ranging from humanist psychology to education philosophy.

- c) The influence of **Marxist philosophy was exclusive to the Danish model** and did not transpire at all in the medical PBL model.
- d) Via the work of Illeris, the Danish model shared Deweyan and Rogerian inspirations that were also present at McMaster, and the Piagetian influence that was present at Maastricht. These influences were limited at Roskilde in the days when *fagkritik* still held sway, but grew stronger as critical theory fell out of favour. At Aalborg, where *fagkritik* failed to find a strong anchor point, Illeris' work exerted a more powerful pull on teachers in search of an explanatory paradigm, and therefore **the influence of Deweyan and Piagetian ideas was stronger.**

We can conclude from this that the real demarcating factor between the Danish project work model and McMaster-Maastricht PBL in terms of their intellectual inspirations was the presence of a critical pedagogy line of thought in the Danish model. This particularly set RUC apart from the rest, however, since the influence of radical thinking all but disappeared by the time Aalborg adopted the term 'PBL' in the 1990s.

Although Dewey is often cited as one of the most important references in PBL,⁸⁵⁶ in historic terms, McMaster's ideas on the subject were always rather more fuzzy and implicit than outspoken, as we have seen in Chapter 2. The influence of Dewey was present but rather marginal compared with the influence of cognitive psychology on the work of Illeris, as we saw earlier in this chapter. In both cases, the theme of 'learning by doing' was certainly present, but acted more as a diffuse background than a solid guiding principle. It would therefore quite difficult to use the interpretation of Dewey as a point of comparison between the models.

A more tangible point of comparison would be to look instead at the influence of certain ideas from the field of psychology, or what we have referred to as the internal aspect of the educational process. Let us summarize the history of the underlying psychological principles of PBL: Schmidt can be credited with discovering that the success of PBL as a learning method could be attributed to its capacity to trigger the activation of prior knowledge, the contextualization of and elaboration on acquired knowledge, and increased motivation.⁸⁵⁷ We have shown that these discoveries were spurred by Schmidt's interest in Anderson's Schema Theory, a derivative of Piaget's ideas of knowledge assimilation and accommodation. These ideas were absent at McMaster in the early years, and even opposed when Neufeld and Barrows geared the second McMaster curriculum towards information processing psychology. In Chapter 4 we suggested that there is today no serious opposition to the constructivist psychological explanation for the learning process in PBL. It follows that if the Aalborg model made use of the same principles, it would warrant the former's use of the appellation 'PBL'.

The fact is that not all projects at Aalborg were designed to activate prior knowledge; as Kolmos pointed out, some projects were merely knowledge-application assignments with a set

⁸⁵⁶ See for instance Henk G. Schmidt. 'Foundations of Problem-Based Learning: Some Explanatory Notes.' *Medical Education* 27, no. 5 (1993): 423; and Kolmos, Fink and Krogh, 'The Aalborg Model': 11.

⁸⁵⁷ Henk G. Schmidt, 'Problem-Based Learning - Rationale and Description', *Medical Education* 17, no. 1 (1983):11-16.

of instructions to be followed.⁸⁵⁸ That aside, let us consider Aalborg's so-called 'problem-projects': here, students were confronted with a real-life or realistic situation, which they were to investigate. In order to resolve the problem, they were given courses related to the project, but not before they had considered the problem. This means that in first instance, students would only have their prior knowledge with which to handle the problem. Does this mean that the projects worked as effectively as the problem-triggers of Maastricht in activating prior knowledge? No studies have been done on this subject so it would be presently impossible to conclude. Secondly, In terms of contextualization, Schmidt argued that 'the problem serves as a scaffold for storing cues that may support retrieval of relevant knowledge when needed for similar problems'.⁸⁵⁹ Given that the project problems are and always have been as realistic if not more than the problem triggers of medical PBL, we have an *a priori* reason to believe that this model would enable contextualization and later retrieval of relevant knowledge effectively, but this has not been tested empirically. Thirdly, the existence of group examinations based on the project work, and the requirement that students hand in a group report would *a priori* satisfy the active processing of new information through elaboration although once again, this should be empirically verified. Finally, the epistemological void torn open by confrontation with an unfamiliar real-life problem in a project context would be *a priori* as likely (if not more) to spur student motivation as problems triggers in the medical PBL context. Although no studies on the subject were done historically, there is some empirical evidence to suggest that this is indeed the case with the model as it is applied today in engineering: Zhou, Kolmos and Nielsen showed the multiple ways in which the Aalborg model could stimulate motivation in an engineering group in a study done in 2012.⁸⁶⁰

What can we conclude from this? In the absence of data, simply that *a priori*, there is no reason to believe that a curriculum that handles educational problems in a project format should not be able to trigger the same learning processes as a curriculum that handles problems with shorter, teacher-formulated triggers. This *a priori* statement should not come as a surprise given that the Danish model was supported in part by the same Piagetian arguments as those used by Schmidt to support the Maastricht model. In this sense, Kolmos may well have been right in claiming that there are common educational principles underlying PBL and the project work model. But is the similarity of educational principles enough to justify joining the models under one roof? If so, then perhaps all educational innovations which claim some Piagetian ancestry should also be considered as potential candidates to the title 'PBL'. But there is already a title for this sort of education: 'progressive' education. This therefore is clearly not a satisfactory answer – perhaps rather than whether these programmes trigger constructivist learning processes, the question should be *to what extent*, and this calls for an analysis of organizational principles of PBL and project work curricula.

⁸⁵⁸ Kolmos, 'Reflections on Project Work': 142-143.

⁸⁵⁹ Schmid, 'Foundations of Problem-Based Learning', 428.

⁸⁶⁰ Chunfang Zhou, Anette Kolmos and Jens F.D. Nielsen. 'A Problem and Project-Based Learning (PBL) Approach to Motivate Group Creativity in Engineering Education', *International Journal of Engineering Education* 28, no. 1, (2012): 3-16.

Organizational confusion

Looking at a cross-section of the four curricula as they were in 1975, it would not take an education expert to conclude that the student's experience at McMaster and Maastricht would have been nothing like their experience at Roskilde or Aalborg, because the learning was organized so differently. A student at Maastricht in 1975 would have attended pre-scheduled tutorials twice a week, a *Skillslab* session once per week, and perhaps a two hour lecture if required, while the rest of his time would have been dedicated to self-study based on the learning objectives of the tutorial session. A student at the Tek-Nat Faculty Aalborg in 1975 would have attended a significant number of lectures, some independent of project content and others bound to the project content, and then divided his time between self-organised project meetings with his teammates, and if necessary, the project supervisor. The amount of time he spent on the project per week would have depended on how close to the deadline the student was, with more time spend on courses in the beginning of a semester than in the second half. Our Maastricht student would be covering one to two problems per week, resulting in an end-of-block examination after only six weeks whilst our Aalborg engineering student would be labouring away on a lengthy, complex problem for which he would need the support of technical lectures. Our future engineer would not even have finished his first problem-project by the time our medical student had closed off his second 'block'. As a comparison of a cross-section from 1975, then, it would be hard to argue that there are sufficient similarities between the organisation of PBL and the organization of project work to merge them under one conceptual banner.

However, the curricular organization of PBL and project work has become somewhat more confused since 1975. On the one hand, the proliferation of 'PBL Hybrids' has cast a shadow on many of the core tenets of the McMaster-Maastricht PBL; namely the availability of ample time for self-study, the reduction of lecture hours, and the primacy of problems over knowledge-transfer. Certainly, PBL hybrids still offer a variable amount of time spent in tutorial groups with a tutor who acts as a process-guide. But since students are not provided with sufficient time to study on their own, these hybrids compensate with traditional knowledge-transfer lectures and focus PBL tutorials instead at best on elusive 'collaboration skills', at worst on Barrows-style 'reasoning skills' (of which we have already demonstrated the futility). One might dismiss these programmes straight off the bat by simply stating that they are not problem-based at all, but since even Maastricht fails to abide by its own PBL standards these days, it becomes very difficult to sort the wheat from the chaff.⁸⁶¹ If the ideal model of PBL exists only on paper in the scientific literature, can it justifiably be used as a benchmark for practice? On the other hand, Aalborg itself has begun adopting some of the educational format of the Maastricht curriculum. In 2013, Aalborg opened a new medical school that combines the Maastricht approach to PBL with project work.⁸⁶² Add to this the emergence of models that propose a cocktail of many approaches including PBL and project work, such as the engineering curriculum at Universiti Teknologi Malaysia, providing clear-

⁸⁶¹ Moust, van Berkel and Schmidt, 'Signs of Erosion'.

⁸⁶² Stentoft, Duroux, Fink and Emmersen, 'From cases to projects'.

cut demarcations becomes almost impossible.⁸⁶³ We have determined that historically and organizationally, PBL and project work are riddled with differences, but where does project work end and PBL begin? And does this bury the ‘common principles’ argument for merging beyond retrieval?

Defining boundaries for PBL

Given the failure of our first attempt to draw a definite line between PBL and non-PBL in the spectrum of hybrids, projects and ‘eroded’ PBL curricula, we must step outside the scope of History as a discipline to look at the present situation with a novel perspective.

In the eyes of a neutral party, it might seem as though the players in this debate are not mere education providers trying to figure out how they compare to a ‘pure PBL’ model that exists ‘out there’, but are instead engaged in a process of defining and redefining the areas covered by PBL themselves. To do this, they call into play arguments from the disciplines of psychology, history and philosophy, in an attempt to perform some kind of ‘boundary work’ around PBL, to borrow the term from the sociologist of science Thomas Gieryn.⁸⁶⁴ The intellectual battle is principally taking place at present between a small gathering of heavy-weight scholars of PBL, principally from the Netherlands, whose strength lies in the production of high-quality scientific research on PBL that scores significant citation impacts,⁸⁶⁵ and a group of engineering education specialists whose strength resides in outreach to new education markets and brand-building around their model. The former group is attempting to enclose the PBL debate around principles researched and discussed in the scientific literature and dismiss everything else as unimportant. The latter wants to see the definition of PBL expanded to encompass the project form of problem-oriented education. The two opposing groups have used different strategies to strengthen their case: the former through scientific publications in high-impact journals, the latter through rallying to their cause high-prestige institutions such as UNESCO and the European Society for Engineering Education (SEFI), organising a large number of conferences in which they invite speakers from both models, and the development of an online Masters programme on problem-based learning in engineering and science.⁸⁶⁶ Both parties have understood the fundamental importance of international visibility for their cause, and have developed professionalised outreach strategies for their models as a result, with Asia, Latin America and sub-Saharan Africa as favoured targets.⁸⁶⁷

⁸⁶³ Mohd Yusof, Tasir, Harun, and Helmi, ‘Promoting PBL in Engineering Courses at the Universiti Teknologi Malaysia’.

⁸⁶⁴ Thomas F. Gieryn, ‘Boundary-work and the Demarcation of Science from Non-science: Strains and Interests in Professional Ideologies of Scientists’. *American Sociological Review* 48 (6), 1983: 781–795.

⁸⁶⁵ De Pinho, Mota, Conde, Alves, and Lopes. ‘Mapping Knowledge Produced on PBL’.

⁸⁶⁶ ‘Masters in Problem-based Learning in Engineering and Science’, Aalborg University, accessed May 10, <http://www.mpbl.aau.dk/>.

⁸⁶⁷ Aalborg uses its Centre for PBL for outreach, ‘Aalborg Centre for Problem-Based Learning’, Aalborg University, accessed May 18, 2016, <http://www.ucpbl.net/>. Maastricht has a department called ‘MUNDO’ dedicated to outreach. Gerard Majoor and Han Aarts, ‘A role for problem-based learning in higher education in the developing world’. In *Lessons from Problem-based Learning*, ed. Henk van Berkel et al. (Oxford, UK: Oxford University Press, 2010), 254.

The tug-of-war has generated a non-negligible amount of confusion for practitioners, who might attend a conference in which they are presented with PBL as project work but upon seeking further information encounter the oft-cited 1980 treatise on PBL in medical education of Howard Barrows and find no point of comparison between the two. The culture of consulting high-impact scientific publications on education being far from normalised amongst the majority of academics who are first and foremost experts in their disciplines and only incidentally educators, the average PBL novice will invariably seize one of the innumerable books written on the subject, none of which deal with the historical, philosophical or psychological underpinnings of PBL to a serious extent. Confusion thus reigning supreme, the novice practitioner will happily concoct his own educational alchemy from various sources of inspiration (none of which include a reference to the Founding Fathers) and call it PBL. The author has witnessed this phenomenon across almost every country in Pacific Asia, from Japan in the North-East, to Indonesia in the South and Malaysia in the West.

Ultimately, there are three possible resolutions to this conundrum. Firstly, the scientific community rebels against the use of ‘PBL’ as a hold-all name for progressive education methods, either by flooding the field with articles to that effect, or by co-opting heavy-weight education scholars in new PBL-adopting institutions into the exclusionary perspective. This scenario will only take place if the scientific community finds a way to make their point intelligible to the wider audience of novice educators, which may mean translating the findings of high-impact publications into easy-access books and multimedia content, since this is what educators use. Second possibility, the adoption of ‘PBL’ to describe all programmes which contain a problem-oriented small-group component succeeds due the superior capabilities of the proponents of this approach to influence practice – if enough people call an apple an ‘orange’ for long enough, then it takes on the name ‘orange’, that is the very nature of language. This will only happen if the heavy-weight contributors in the scientific field retire, retreat from their position or cease to care about the distinction. Thirdly, and most likely, confusion will remain with the scientific community dominated by the Netherlands and North America meaning one thing with PBL and the educational practice increasingly meaning two things at once. The split in this scenario would last until either the debate becomes irrelevant because all forms of problem-orientation are replaced by something entirely new, or because a significant shift occurs that tips the balance in favour of the first or second scenario.

PBL: from disputed to instrumentalised

How did we get into this situation? When John Evans drafted his memorandum in 1966, he could not possibly have imagined the scale and scope of the debate surrounding his brainchild almost fifty years later. The historical evidence presented in Part 1 of this treatise will hopefully have convinced the reader that none of the founding fathers had any idea of the legacy they were building when they decided to make self-directed, small-group problem-based learning the *modus operandi* of their medical school. The conspicuous absence of McMaster’s voice in the PBL-project work could be seen as a sign that the small Canadian school never fully took on a leadership role in the educational revolution it inspired. The fact that the name ‘problem-based learning’ wasn’t coined until the second generation of McMaster medics took over is

further evidence that as far as Evans and co. were concerned, the outlook was rather more pragmatic than messianic. It is possible that the trial-and-error nature of the first PBL programme – cobbled together with ideas borrowed from Harvard, Western Reserve and Oxbridge, combined with a loose association of Flexner, Rogers and Dewey ideas and the occasional quote from Comenius – is the very reason that PBL is vulnerable to twists in interpretation. The fact that McMaster never wrote its little red book of PBL meant that others could come by years, even decades later and re-write PBL theory to suit whatever educational practice they might have.

It could be argued that both Barrows and Schmidt sought to fill in the theoretical void left by McMaster's Founding Fathers, but the very fact that there were two rather than one line of argument about PBL's purpose and effectiveness, that it took so long for Schmidt to prevail in the literature and that practice did not automatically follow from this has, in the author's opinion, furthered the general impression amongst novice educators that PBL is a loose term for progressive education that can be bent to fit as required. To take just one example, the dominance of a single clear and vocal founding father both in theory and practice of the Jigsaw Method – namely Elliot Aronson – compared with the fragmented theory and practice of PBL, explains why nobody would think of calling case-based learning a 'jigsaw' classroom. The same goes for all methods which have a clear and identifiable founder endowed with both theoretical credibility and a successful history of practice (e.g. Montessori, Dalton, Steiner...). PBL on the other hand, both carried and plagued by so many prophets, practitioners with little theoretical reflection and theorists with minimal connection to practice, has wrought upon itself both international renown beyond the scope of any other educational invention of the 1960s and also confusion and fuzziness unlike any other method. And where confusion reigns, ultimately instrumental concerns will prevail – in an educational climate governed by the necessity of profitability, anything that can be used to increase marketability will be used to that effect.

In addition, although the Maastricht contingent did much to anchor the scientific credibility of PBL as an effective learning method, their failure to also address the societal and educational purpose of PBL by containing their research within the exclusive field of cognitive psychology has opened PBL for further instrumentalisation. Indeed, if the question 'how we learn' with PBL is addressed but the question 'why we learn' is not, then the method risks becoming a hollow tool that could well be put to use in a socially-transformative context but also as in a narrower, discipline-bound and employability-focused programme. Unfortunately, the global educational mood seems to favour the latter at a time where it may well need the former more than ever.⁸⁶⁸ Thus, PBL, a world-famous, scientifically researched, historically successful method of education with disputed boundaries, could well represent competitiveness-hungry but resource-poor tertiary institutions' golden egg, because they can take what they want from the

⁸⁶⁸ For an of such a focus on employability, particularly in South East Asia, see: Hasyamuddin Bin Othman, Abdullah Bin Sulaiman, Nor Ratna Binti Masrom, and Yahya Bin Buntat, 'The Instillation of Employability Skills Through Problem Based Learning Model at Malaysia's Higher Institution' (paper presented at the International Conference on Teaching and Learning in Higher Education, in Kuala Lumpur, Malaysia, November 23-25, 2009). Accessed May 18, 2016, http://eprints.uthm.edu.my/316/1/Hasyamuddin_Bin_Othman.ICTLHE.pdf.

method to suit their cost-saving, employability skills-oriented agendas, leave the rest, and claim moral authority because of the method's world-fame. Taking them at their word, almost nobody turns to ask 'what works, which PBL?' because almost nobody knows what's what in PBL and there is no overarching reference to turn to.

This instrumentalisation, in the author's view, is an unfortunate hamper to the educational potential of PBL. While it is true that the founders of McMaster borrowed from a host of intellectual influences, these influences all had one thing in common: a commitment to making education more relevant to the conditions of society and to human nature. They did not all agree on what those conditions were and how the change might be achieved, but to deprive PBL of that transformative ambition by focusing exclusively on the cognitive processes of students or on its potential to train 'collaborative skills' would be to strip it of the wider societal reflection that was present in the works of its intellectual forefathers. We do not owe it to these giants of education theory to honour their vision out of filial piety but because in this time of social unravelling where societies find themselves ripping at the seams from the ever increasing weight of socio-economic inequalities and global challenges, we urgently need a transformative vision to harness the power of education. Therefore, this historical treatise will close on a reflection of a more philosophical nature and argue that the transformative power of PBL lies in its emphasis on self-direction, but this principle must be bound by the ideal of social progress. The final chapter will offer a historical and philosophical reflection on self-direction, its role in PBL, and how this could be harnessed to give higher education a direction for the future.

This final chapter builds onto the conclusions of chapter 5 regarding the instrumentalisation of PBL in higher education. We will show that self-directed learning has been a core feature of PBL since its inception in 1966 by first retracing the origins of self-directed learning and its link to McMaster's programme. So doing, we shall argue that it is self-directed learning, more than any other feature such as the use of problems and small groups, that makes PBL such a unique and potentially transformative educational method. From there, we shall deconstruct the existentialist assumptions underlying self-directed learning as it was interpreted in early PBL curricula, to show that such an interpretation deprives the method of any social-transformative power. We will propose two angles of criticism to this approach, one from the critical pedagogy of Paulo Freire, and the other from the cultural history perspective of Vygotsky. We shall close with a vision of the future of self-directed learning in PBL that stands in line with PBL's historical origin, the social-transformative ambitions of its founding fathers and intellectual forefathers, and provides some guidelines for the kind of PBL that could contribute to education as an empowering experience for students, teachers and society.

On the Origins of Self-Directed Learning

The term 'self-directed learning' was made famous by Malcolm Knowles in his book by the same name, published in 1975,⁸⁶⁹ but the idea of self-directed learning and its influence on PBL obviously pre-dates the work of Knowles since Evans called for self-direction in his students in his founding memorandum of 1966.⁸⁷⁰ In chapter 2 of this treatise we traced the link between the work of Knowles and that of American psychologist Carl R. Rogers. For the sake of refreshing the reader's memory, the link can be summarized as follows: Knowles was a doctoral student of American education theorist Cyril Houle. The latter published in the early 1960s a series of studies on self-directed learning in adult learners under the title *The Inquiring Mind*.⁸⁷¹ Knowles was also inspired in his writing by the work of Alan Tough, who submitted a dissertation on the subject of self-directed learning in adult education under Houle some years before Knowles and whose findings were published in 1971.⁸⁷² Although many people assume that it was Houle who coined the phrase 'self-directed learning', recent historical research by Brockett and Donaghy suggests that Knowles had been using the term 'self-directed learning' in his work since 1950, thus over a decade before his supervisor!⁸⁷³ Where did he get the idea? According to Knowles' autobiography, his greatest source of inspiration was discovered during a class taught by Arthur Shedlin, an associate of Rogers, who taught at the University of

⁸⁶⁹ Malcolm S. Knowles, *Self-directed learning: a guide for learners and teachers* (Chicago, IL: Association Press, 1975).

⁸⁷⁰ John R. Evans. 'General Objectives'. Memorandum from 1966. Objectives of the Faculty School of Medicine - HHS/FHS Archives, Box 145.8;1. McMaster University, Hamilton, ON.

⁸⁷¹ Cyril O. Houle, *The Inquiring Mind* (University of Wisconsin Press: Madison, 1961).

⁸⁷² Allan Tough, *The Adult's Learning Projects* (Institute for Studies in Education: Toronto, 1971).

⁸⁷³ Ralph G. Brockett, and Robert C. Donaghy, 2005, 'Beyond the Inquiring Mind: Cyril Houle's Connection to Self-Directed Learning'. Paper presented at Adult Education Research Conference, Knoxville, TN: The University of Tennessee, 2005. <http://newprairiepress.org/aerc/2005/papers/68/>

Chicago when Knowles was studying for his Masters degree in the late 1940s.⁸⁷⁴ From that moment on he claims to have read everything by Rogers that he could get his hands on.

Carl Rogers was an American psychologist, psychotherapist and educationist, born in 1902, who studied at Columbia University Teachers College where he obtained his MA in 1928 and his PhD in 1931.⁸⁷⁵ After the Second World War, Rogers set about developing psychotherapeutic principles for his practice that sat in direct opposition to behaviourist therapy. In 1945, he headed to the University of Chicago to begin a long and fruitful career in academia. We can see in some of Rogers' earliest published work, a few years before Knowles began his instruction under Shedlin that he referred to 'self-directed action' as the desired end-goal of psychotherapy.⁸⁷⁶ However, it wasn't until the publication of his *magnum opus* from 1951 *Client-Centred Therapy* that Rogers began to use the term 'self-directed learning'.⁸⁷⁷ Interestingly, while the book was littered with references to self-direction in psychotherapeutic terms, Rogers still referred preferentially to 'student-centred teaching' in the chapter on education. The reference to 'self-directed learning' in *Client-Centred Therapy* was actually a quote from a paper from Paul Eiserer from 1949. Eiserer was a relatively unknown education scholar who did his PhD and then his assistant professorship of education and psychology at Chicago.⁸⁷⁸ His stay at the institution corresponds with the time period that Shedlin and Rogers were active at the department of psychology, and as such they would have been colleagues. It is clear from the works cited by Rogers that Eiserer shared his views on education. Thus while it is difficult to attribute the first use of 'self-directed learning' to a specific person, we can with some degree of certainty point the finger at the circle of educators revolving around Carl Rogers in the later 1940s and early 1950s, including Knowles, Shedlin, and Eiserer. The group shared certain assumptions about self-directed learning, and particularly about the nature of the 'self' in question, but since Rogers was the most prolific and most renowned writer on the subject, we shall take his works as the reference-point to derive our deconstruction of self-directed learning from here onwards.

Client-centred, or person-centred therapy focused on the relation between the therapist and the client (note that Rogers refused to call them patients) as one of empathy, trust, and the unconditional positive regard of the therapist towards the patient. In such a threat-free setting, the client could let himself be vulnerable and open up to his own feelings of anxiety such that both he and his therapist could be their genuine selves. These ideas were premised on the notion that humans were a unique breed; different in their thought patterns from animals - representing a rejection of Skinner's ideas of psychology as a form of instinct-driven social control

⁸⁷⁴ Malcolm S. Knowles, *The making of an adult educator: an autobiographical journey*, 1st ed. (San Francisco, CA: Jossey-Bass, 1989).

⁸⁷⁵ Baldwin R. Hergenhahn, *An Introduction To The History Of Psychology*. 4th ed. (Belmont, CA: Wadsworth Pub. Co., 2001), 524-525.

⁸⁷⁶ Carl R. Rogers, *Counselling and Psychotherapy : Newer Concepts in Practice* (Cambridge, MA: Houghton Mifflin Company, 1942), 43, 90, 233.

⁸⁷⁷ Carl Rogers, *Client-Centred Therapy*, Kindle ed. (New York: Constable & Robinson, 2003), loc. 6547.

⁸⁷⁸ Thomas K. Fagan, 'Eiserer, Paul E.' In *Historical Encyclopedia of School Psychology*, ed. Thomas K. Fagan and Paul G. Warden (Westport, CT: Greenwood Press, 1996), 121-122.

mechanism.⁸⁷⁹ Instead, Rogers saw in people an unlimited potential for good, waiting to be unbound – his theory and method were therefore labelled ‘humanist’ or ‘third-force’ since they fit neither the behaviourist nor the Freudian therapeutic paradigms of the time. His commitment to human betterment was shared by his contemporary Abraham Maslow, whose seminal 1943 paper on human self-actualization sparked the humanist psychology movement.⁸⁸⁰ In particular, Maslow proposed a hierarchy of human needs, at the top of which was self-actualization, defined simply as: ‘what a man *can* be, a man *must* be’.⁸⁸¹

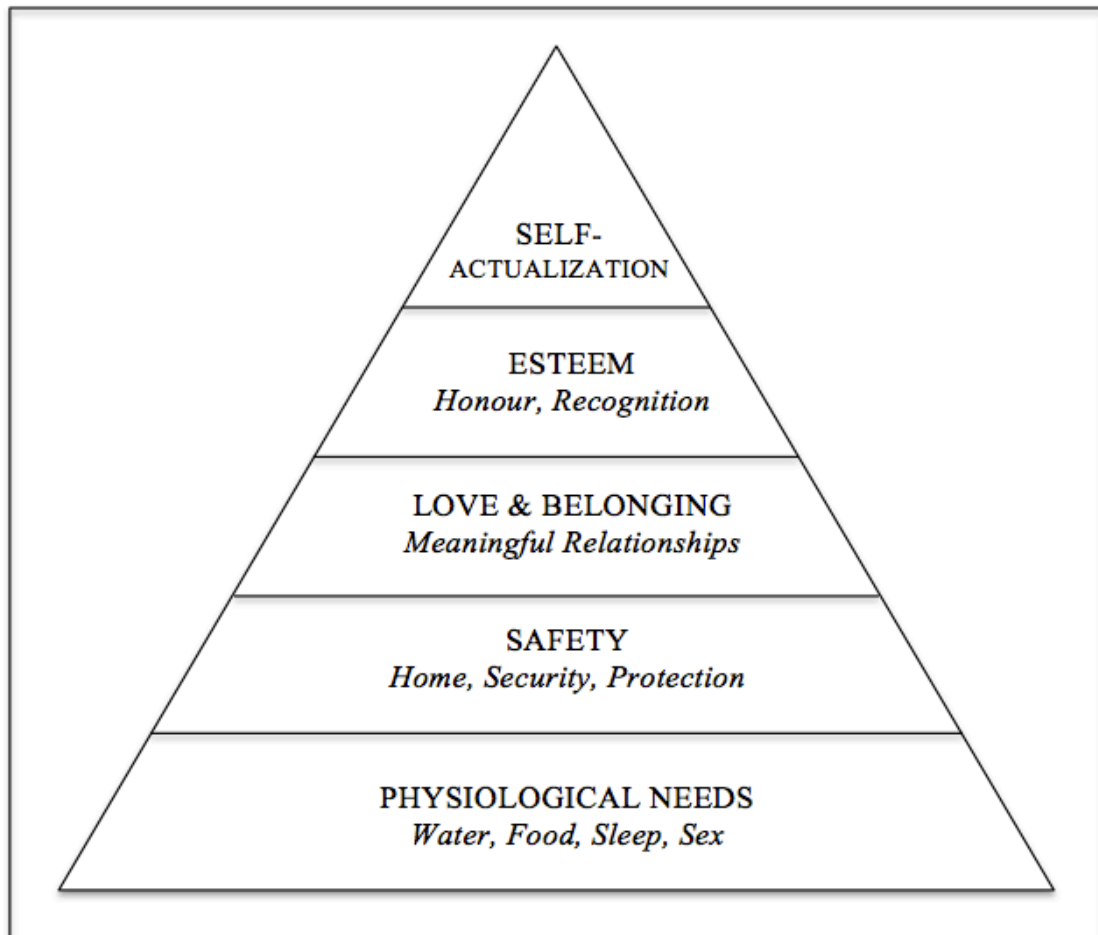


Figure 12: Maslow's Hierarchy of Needs (1943)

One should not confuse Maslow's understanding of self-actualization with Aristotle's manifest characteristics: a person does not actualize in the sense that an acorn actualizes into a tree or bricks and mortar into a house. Instead of this deterministic definition, Maslow's idea was closer to Jung's process of 'individuation', that is, the harmonization of the relationship between the conscious *ego* and the unconscious to allow the person to become whole.⁸⁸² For Maslow, this meant that each individual had a unique (latent) potential, and when all other

⁸⁷⁹ See for instance Rogers' tirade against Skinner in Rogers, Carl R. Rogers, *Freedom to Learn* (Columbus, OH: Merrill, 1969), 260-261.

⁸⁸⁰ Abraham H. Maslow, 'A theory of human motivation', *Psychological review* 50, no. 4 (1943): 370-396.

⁸⁸¹ Maslow, 'A theory of human motivation', 382. As Maslow pointed out, he did not invent the term himself, it was coined by Kurt Goldstein.

⁸⁸² Carl Jung, 'Über die Archetypen des kollektiven Unbewussten' [Archetypes of the Collective Unconscious], *Von den Wurzeln des Bewusstseins* (Zurich: Rascher, 1954).

lower needs were met, an urge to fulfil this potential. And while this urge did not necessarily have to be creative, it would bring out creativity in people who had that potential.⁸⁸³

Rogers used the phrases ‘self-actualization’ in reference to Maslow, but also ‘fully-functioning person’ interchangeably in his work; a fully-functioning person being someone living congruently with himself through an organismic valuing process. For Rogers, this curious vernacular denoted a strong criticism of the unhealthy valuing processes of adults, their healthy valuing process having been tampered with during childhood by the disapproving words and conditional regard from their parents and peers. Congruency could only be restored when a person divorced self-perception from this parental and social trauma and aligned instead with the values transmitted by his organism in every moment, as it arose. The role of humanist psychology was to help people overcome these blockages and help them rebuild their innate organismic valuing process in order to attain self-actualization. This commitment to self-actualization formed the foundation on which derivative concepts such as ‘self-directed learning’ were built in Rogerian education theory.

Rogers’ forays into education theory came in parallel to the take-off of his academic career. His first attempt to codify his educational ideas took form in *Client-centred Therapy*, but his chief work on education was published in 1969 under the title *Freedom to Learn*. The latter book comprised a reformulation of the learning principles first penned in the former, informed by his experiences as a university lecturer in psychology and anecdotes gathered from colleagues and fellow teachers around the USA. In *Freedom to Learn*, Rogers compiled a series of anything-but-scientific essays and passionate statements on education and the nature of human learning. In particular, he detailed the need for and means to achieving self-directed learning, a proposition he had already been working on since 1951.

By his own admission, Rogers’ ideas were informed and inspired by existentialism; in particular the existentialist philosophy of the rebellious nineteenth century Danish thinker Søren Kierkegaard and the existentialist psychology of Auschwitz survivor Viktor Frankl.⁸⁸⁴ Although this may seem like a trivial historical anecdote, these existentialist views of the World and the Self pervade through Rogers’ work, and his ideas on education and self-directed learning cannot be understood without some grasp of this intellectual backdrop.

Among Kierkegaard’s writings, the *Concluding Unscientific Postscripts* of 1846 contained the clearest description of his pedagogical views.⁸⁸⁵ According to Kierkegaard, in a world where the other was perpetually inaccessible to the self, the purpose of life was to become an actualized individual, thereby eschewing *dread* and empowering oneself to make moral choices (in Kierkegaard’s esoteric World, this meant Christian moral choices). The purpose of education therefore, was to enable the individual to find his authentic Self and become it through a free confrontation with fundamental choices. In this quest, objective knowledge was

⁸⁸³ Maslow, ‘human motivation’, 383.

⁸⁸⁴ Rogers, *On Becoming a Person*, 273; *Freedom to Learn*, 151, 268.

⁸⁸⁵ Søren Kierkegaard, *Concluding Unscientific Postscripts to Philosophical Crumbs*. Trans. Alastair Hannay (New York: Cambridge University Press, 2009).

of almost no value, since it could not be processed except through subjectification and internalization. Not that Kierkegaard denied the objective truths of mathematics and physics, he simply did not consider them valuable to the individual who could not embed them within his unique life experience. As Rogers quoted: ‘the truth exists only in the process of becoming, in the process of appropriation’.⁸⁸⁶ That being the case, the real value of education was meta-cognitive – learning to learn. People, according to Kierkegaard, could not learn facts or truths but they could improve their ability to reason and draw appropriate conclusions. One will notice here the parallel with 1960s information processing psychology; what goes around, comes around, as the saying goes.

Frankl’s propositions were somewhat less esoteric: his experiences as a concentration camp prisoner led him instead to reflect on man’s search for meaning.⁸⁸⁷ His conclusion was that humans, no matter the circumstances, were free to choose how to face the conditions cast upon them. This meant that finding meaning was possible in spite of physical suffering, and those who failed to find meaning would be plagued with *nöogenic* neuroses, or neuroses pertaining to the frustration of the ‘will to meaning’. Modern man, he contended, drowning in scientific facts and a predictable world, was plagued with a personal and private form of nihilism, or absence of meaning. Rogers strongly emphasized the importance of this sort of existentialist freedom and the provenance of meaning from within the individual in his work on education.⁸⁸⁸ From all of these ideas, Rogers derived a proposal for education that can be summarized as ‘self-directed learning’: a form of education where the student was literally in charge of all aspects of learning, from choosing the problems to work on to selecting the learning resources and teachers. Self-directed in its most extreme sense, Rogerian education resembled more a therapy session for educated adults than a classroom. His idea for resolving all educational problems, as proposed in the final chapter of *Freedom to Learn*, was to get representatives of all interest groups involved in education to form an ‘encounter’ or ‘T’ group and talk about their feelings on the education programme openly and honestly as ‘real’ people. In between these groups, learning would happen at the behest of the student and his natural drive for learning that would push him to seek out knowledge, and therefore find it.

PBL’s infatuation with self-directed learning began with McMaster’s founding memorandum of 1966, the earliest document describing PBL on record. In this short mission statement, Dean John Evans wrote of his wish for McMaster students to acquire: ‘the ability to become a self-directed learner, recognizing personal education needs, selecting appropriate learning resources and evaluating progress’.⁸⁸⁹ In the years that followed, Mustard called it ‘self-

⁸⁸⁶ Rogers, *Freedom to Learn*, 272.

⁸⁸⁷ Viktor Frankl, *Man’s Search for Meaning*. (Boston, MA: Beacon Press, 2006)

⁸⁸⁸ Rogers, *Freedom to Learn*, 269.

⁸⁸⁹ John Evans, ‘General Objectives’. Memorandum from 1966. Objectives of the Faculty School of Medicine - HHS/FHS Archives, Box 145.8;1. McMaster University, Hamilton, ON.

education’,⁸⁹⁰ Spaulding talked about ‘individualized lifelong learning’,⁸⁹¹ and ‘self-organized activity devoted to comprehension’, Walsh referred to ‘self-education’ and ‘T-Groups’ (another word used by Rogers to talk about Group Encounters).⁸⁹² Around the time the Founding Fathers left, Malcolm Knowles’ book *Self-Directed Learning* made the rounds of the education committee as the *de facto* reference on the subject, after which ‘self-directed learning’ became the standard phrase in use.⁸⁹³ This is evidenced by the fact that almost every policy document coming out of the EC from 1977 onwards had some reference to self-directed learning, usually associated in the writing of EC members McAuley, Whelan, Barrows, Sargeant *et caetera* along with other idioms of information-processing psychology such as ‘problem-solving skills’. Renewing their commitment to Rogerian psychology, the EC brought into circulation in 1979 some older works of Rogers and his colleague Thomas Gordon.⁸⁹⁴ There is no indication of what they did with those papers, but the fact that they were deemed important enough to be circulated and archived means Rogers was still in favour in PBL by the end of the 1970s. On things that clearly springs to view from an overview of memoranda from the founding fathers of McMaster is that the core concern of PBL was, from the start, to inspire self-directed learning (or whatever other name was used synonymously at the time). Everything else – problems, tutors, small groups, peer-assessment – constituted a means to that end. It may seem strange then that so much ink has been spilled in the scholarly literature on the precise formulation of problems, the role of tutors, the impact of assessment, and so little on the actual nature and purpose of self-directed learning in PBL.

The term self-directed learning was translated into Dutch at Maastricht as *zelfwerkzaamheid*, a concept enshrined in the school’s *Basisfilosofie* manifesto from 1972.⁸⁹⁵ In the Maastricht context, Wijnen and Bremer re-defined the term as the activation and motivation of the student to use all the possibilities given to them to gain knowledge, insight, skills, also inventiveness and creativity.⁸⁹⁶ In Maastricht, the explicit connection to Rogers was lost, and remained instead as a tacit underlying philosophy borrowed from McMaster. This leaves us today in a situation where self-direction learning is a quintessential part of the fabric of PBL’s history and philosophy, but hardly any educators remember that this springs from Rogers and his circle’s

⁸⁹⁰ Fraser Mustard, ‘Objectives of the Faculty of Medicine’. Letter to D.L. Sackett from November 11, 1968. Educational Programme Committee - 1968 - HHS/ FHS Archives, Box 145.8;1. McMaster University, Hamilton, ON.

⁸⁹¹ William Spaulding, ‘The Undergraduate Medical Curriculum: McMaster University’ Report from October 31, 1968. Objectives of the Faculty School of Medicine - HHS/FHS Archives, Box 145.8;1. McMaster University, Hamilton, ON.

⁸⁹² William Walsh, ‘Attitudes in Medicine - A Draft Submission’, Draft memorandum from January 11, 1968. Educational Programme Committee - 1968 - HHS/ FHS Archives, Box 232.4;4. McMaster University, Hamilton, ON.

⁸⁹³ Geoffrey Norman (*former research assistant of Vic Neufeld and Howard Barrows at McMaster from 1971*), in interview with the author, done at McMaster University, on October 19, 2012.

⁸⁹⁴ Machine-typed copies of Rogers’ ‘The characteristics of a helping relationship’ and Gordon’s ‘The risk in effective communication’ were archived in a box at the HHS/ FHS Archives (244.1;1) alongside various EC memoranda from 1979. McMaster University, Hamilton, ON.

⁸⁹⁵ ‘Basisfilosofie Achtste Medische Faculteit’, 879-84.

⁸⁹⁶ Joost Bremer and Wynand Wijnen, ‘Over Doelstelling En Werkwijze Van Onderwijsgroepen’, memorandum from 1975. Rijksarchief in Limburg, 07.C06 - inventaris 90. Maastricht, Netherlands.

theory of education.⁸⁹⁷ But is this important? We must argue that it is, because of the very peculiar assumptions underlying Rogerian self-directed learning.

On the assumptions underlying self-directed learning

There are three inter-related philosophical assumptions underlying Rogers' work, namely about the Self, Knowledge and Others, that all directly shape self-directed learning. We shall expound each one in turn before exposing the consequent meaning of Rogerian self-directed learning.

The Self

The 'self' has been the central question of existentialist philosophy since its inception, but Rogers was a humanist. Some of the basic premises between the two world views were the same; the key difference between existentialists like Kierkegaard and Frankl on the one hand and humanists like Maslow and Rogers on the other was that while the former did not claim to ascribe any particular outcome to free choice, the latter believed that given freedom, man will choose for his own betterment for he is good by nature. That said, both agreed to the presence of a 'real' self that one could and should access. The 'self', or the 'I' or 'me', was for Rogers a conceptual pattern of perceptions, characteristics and relationships existing in a phenomenal field to which values could be ascribed.

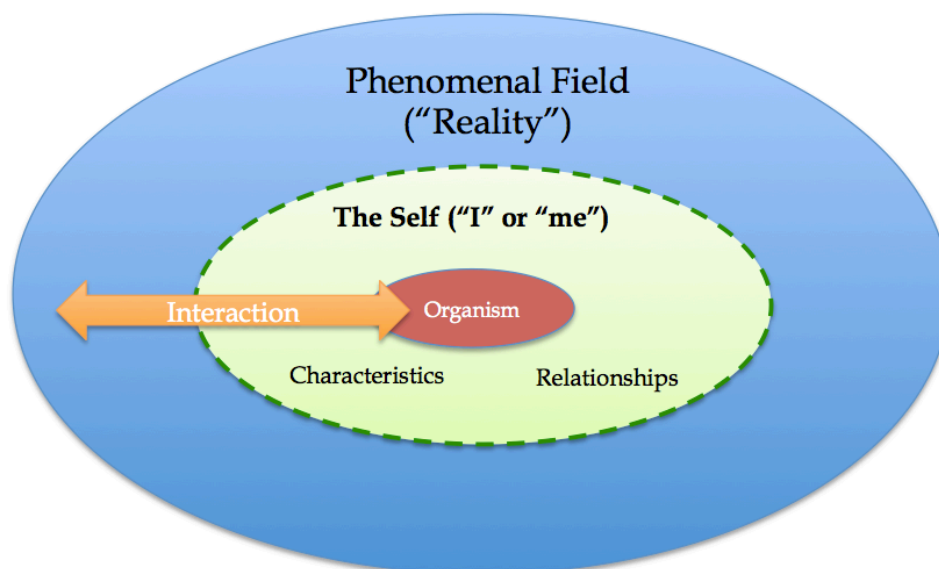


Figure 13: Conceptual representation of Rogers' theory of the self

Let us rephrase this proposition in less esoteric terms: people perceive with their senses, and only with their conscious senses. They cannot perceive with any other person's sensory organs and therefore are always limited to their own sensory, or organismic experience. The reality

⁸⁹⁷ A notable exception made for Maggi Savin-Baden and Claire Howell Major, *Foundations of Problem-Based Learning* (Maidenhead: Open University Press, 2004), 13-14.

that emerges from this sensory experience is, to Rogers, the only reality, characterised as a ‘phenomenal field’. The ‘Self’ is therefore necessarily a part of that whole – if it is a part of reality then by definition it cannot lie outside of one’s experience of the World. The Self is therefore the result of the organism interacting with its environment within the phenomenal field; a bubble of conceptions labelled ‘I’ and ‘me’ by the organism that does the perceiving within the individual’s reality. Note that humanist psychologists are not idealists in the Hegelian sense: they do not claim that the World exists only in the mind, merely that our understanding of the World is mediated by our experience of it and therefore cannot be objective in a scientific sense. Neither do they embrace the notion of a non-positional Self wholly devoid of identity as per Jean Paul Sartre. The conceptions that make the Self in humanist theory do have a number of characteristics and relationships associated with them by the organism, particularly as a result of the *evaluational* interactions with others in the phenomenal field. Once these perceptions reach the conceptual level, the organism is able to ascribe values to them, and these crystalize into the fully formed notion of ‘Self’. So the Self is never completely empty, and while it is free to re-evaluate itself at any given moment in time, it is not transcendental. Given the importance of the organism in Rogers’ theory of Self, we can say that his definition of the Self is closer to Kierkegaard’s ‘relation that relates to itself’ than Sartre’s being for-itself that ‘is what it is not and is not what it is’.⁸⁹⁸ What does this definition of the self imply?

Firstly, that in order to be ‘real’, the Self must accept the inputs of the organism as they come and assimilate them into the ‘structure of the Self’, thus existence does precede essence to some extent, though not quite in the radical sense imagined by Sartre: simply that the Self is in a constant flow following the winding river of experience. Taking as a starting point, therefore, that perceptual inputs precede the values that are ascribed to them, these values can either be ascribed to the Self ‘organismically’, or they can be imposed from external points in the phenomenal field, such as peers, parents and social pressure. The capacity to restructure the Self constantly in synchronicity with the organism is the hallmark of psychological adjustment, and thus the ability to self-actualize. But Rogers believed that people’s organismic valuing process was obstructed by fixed structures of the Self, unable to adjust to perceptual inputs that threatened them. These structures were fixed by the expectations of the outside world weighing on the Self, which would try to fit incoming information to the expectations rather than restructure the Self to adjust to the organism’s response, in a process that the existentialist psychologist Rollo May would have referred to as ‘self-alienation’.⁸⁹⁹ Quite unlike the existentialists, Rogers’ ideas of the Self were infused with Rousseau-like romanticism about the nature of people, and learners in particular, to the extent of claiming that all people, regardless of culture, nationality or socio-economic background would naturally tend to actualize if they could break free of their rigid Self-structures. This view qualifies as humanist rather than existentialist view, but the implications for the nature of knowledge are quite similar.

⁸⁹⁸ Søren Kierkegaard, *The Sickness Unto Death* (London: Penguin Classics, 2004), 43; Jean-Paul Sartre, *L’être et le Néant – Essai d’ontologie Phénoménologique* (Paris: Gallimard, 1943), 93.

⁸⁹⁹ Hergenhahn, *The History of Psychology*, 513.

Knowledge

If reality is limited to the phenomenal field, it follows that ‘truth’ is for the individual also thereby constrained – a fact can only become a fact to the learner when it penetrates the barriers of the phenomenal field through the transformational process of experience. Social reality being the sum of the individual phenomenal fields, constrained by the ever-changing and irreconcilable experience of separate persons, it is by necessity fluid; in every moment new and unpredictable. In the context of reality’s kaleidoscopic morphing act, it stands to reason that from this perspective, factual knowledge is obsolete almost the instant it is acquired. Therefore, the only thing worth learning for Rogers is the process of learning itself. As his intellectual forefather Kierkegaard would have argued, learning to solve problems, mastering the art of reasoning and sharpening one’s ability to learn are the only things worth investing in, as the rest ebbs and flows with the tide of experience. Furthermore, Rogers posits that the methods of positivism constitute an evil that stands the way of human actualization – a strong critique of psychology’s attempt at scientific validity. Instead, Rogers argues, psychology and all human sciences should be approached phenomenologically, placing themselves as sciences of understanding rather than prediction; a proposition reminiscent of the late nineteenth century *verstehen* movement in sociology.⁹⁰⁰ In this impossibly ephemeral knowledge-world, how is the learner to know what to learn? Rogers argues: the learner knows organismically what he wants to learn, and should therefore let his organism guide him towards knowledge that is relevant to him as a learner in the moment. And thus, the roots of self-directed learning were sown.

Our relation to the World

The final assumption of importance for understanding self-directed learning is Rogers’ view on individuals’ relation to the world around them. If individuals are separated by their phenomenal fields of experience, and what constitutes knowledge to one does not to the other, then how does one relate to the World and others? For Rogers, the answer is simple: our emotions and deepest, most real feelings are the ties that bind us to others. Much like Kierkegaard, Rogers does not place value on the notion of a collective other, a ‘society’ that might be greater than the sum of its parts, and instead understands the social world as a series of interpersonal relationships. Since individuals cannot experience anything other than their own phenomenal field, the best they can do to let others understand their reality is to communicate their own experience in the most real way possible, as it happens in the moment. Communication, acknowledges Rogers, is problematic – the moment experience is shared, it is open to rejection, criticism and ‘threats to the Self’ from others. The reaction of others may threaten a key value or concept associated with the Self, and any individual that is not psychologically adjusted will not be able to deal with this. Thus, the latter will prefer to put up a conscious ‘façade’ and fail to communicate their personal experience. This, says Rogers, equates to locking people up in private dungeons. For somebody who proposed a ‘third force’ in psychology, Rogers’ theories had a remarkably Freudian flavour: the façade is not so different to the *super-ego* and the ensuing malaise to *neuroses*.

⁹⁰⁰ Jan Bransen, ‘Verstehen and erklären, philosophy of,’ in *International Encyclopedia of the Social and Behavioral Sciences*, ed. N.J Smelser and P.B. Baltes (Oxford: Elsevier Science Ltd, 2001), 16165-16170.

How then should interpersonal relationships function? Rogers argued that those who do not recoil before threats to the Self but instead communicate what they feel tended to be realistically and soundly social – ‘social’ defined here as point of contact between internal states moving outward in the World. For Rogers, the path from the private dungeon to sound social ability runs through an environment of psychological safety, where threats to the Self are low. Thus, if the learner is to open himself up to learning – an experience as deeply restructuring as psychotherapy – then the learning environment must be as free of threats to the Self as the therapist’s room. For that to happen, the learning process can only be self-directed.

Rogers’ Self-Directed Learning

If Man’s purpose in life is to self-actualize, it follows that this is also the purpose of education. In fact, as Kierkegaard posited, education may well be the greatest tool to succeeding in this goal, given its ability to set Man on the path to discovering his authentic Self. But, as we have stated, according to Rogers, the learner alone knows what is important for him to learn: he cannot be told by others since one person’s reality is incommensurable with another’s. The consequence is that the only valid form of education is *self-directed learning*: learning guided by the person’s organismic valuing of his own interests and desires for learning. What if those interests are destructive or nihilistic? Not so, says Rogers, for in his humanistic world-view, all students once set free are driven to learn, discover, create and build and should be treated as such. Thus, teachers can only serve as the facilitators of the student’s process of self-discovery – to do this, they must have an open and trusting relationship with their students based on positive regard in a classroom that exudes psychological safety. In this utopian place of learning, the teacher hardly teaches; self-directed learning is a process that is entirely student-guided, an ‘anything-goes’ of humanistic education where a teacher’s advice is merely one signal in the flow of the student’s experience, which he may abide by or ignore as his organism dictates.

We can imagine the consequence of this particular breed of self-directed learning on PBL if it were applied in a radical Rogerian fashion. Let us picture a Rogerian PBL tutorial, where students would be free to ignore certain learning objectives if they did not correspond with their learning desires; tutors would serve as friends and guides but could not evaluate or judge their students; who would in turn be free to ignore their tutor’s advice if it went against their desired learning goals, assuming of course that students are indeed able to formulate learning goals unassisted; all differences of opinion would be settled by group encounters where feelings would be laid bare and ‘Selves’ would be restructured towards their more actualized versions. This description might sound alarmingly similar to Jim Anderson’s description of a PBL student’s typical week from 1968 (which could well have constituted a chapter of *Freedom to Learn*).⁹⁰¹ Fortunately for the survival of PBL as an instructional method, Jim Anderson’s ideas were taken more as inspirational guidelines than strict rules; in practice, the first McMaster curriculum provided lengthy lists of learning objectives and the ideal of the

⁹⁰¹ Education Programme Committee. ‘Phase I Programme: 1969’. Memorandum from 1968. Educational Programme Committee - 1966-1967 - HHS/ FHS Archives, Box 232.4;1. McMaster University, Hamilton, ON.

non-expert, non-intervening tutor was just that rather than a strictly enforced law. While it is true that the second curriculum, under the influence of information-processing psychology, veered once again towards the focus on learning-to-learn and the sharpening of reasoning skills at the expense of strict content guidance, the idea of an ‘anything goes’ type of learning was laid to rest by the restructuring of the tutorial operated in Maastricht. As Schmidt pointed out in an article from 2000 deconstructing the myths of self-directed learning, formulating learning goals in PBL is hardly a free-for-all! Students do this with the help of their peers and the subtle input of the tutor, who is in turn informed by the problem-crafters, cued in by the contents of lectures and reading suggestions made in the course manual.⁹⁰²

If Maastricht reinstated order in the self-directed learning anarchy, we could simply let sleeping dogs lie and trouble ourselves no further with the discussion. Loyens, Magda and Rikers recently compiled a literature review of self-directed learning in PBL, proposing several definitions and models of interpretation of the concept, and concluding that ‘SDL in PBL does not entail “do-it-yourself education”’.⁹⁰³ So, far, so good – but since we have pointed to Rogers as a source of influence at McMaster, to humanist psychology as the source of self-directed learning, and we are arguing that self-directed learning was historically the beating heart of PBL, we must also lay out a strong criticism of radical self-direction and propose instead a version of self-directed learning more compatible with what our current understanding of human mind, of societal concerns and of the future of PBL.

Against Rogers – Redefining Self-Directed Learning in PBL

Rogers’ theories may have been a product of their time, but even then radically opposite views of learning were emerging, particularly from critical or Marxist schools of thought. We shall propose a re-interpretation of self-directed learning through two dialectic theories: Freire’s Dialogical Theory of Action and Vygotsky’s Cultural-Historical Psychology, and then conclude on the future of self-directed learning and PBL. It is worth noting that neither Freire nor Vygotsky opposed Rogers directly (it would indeed have been problematic for the latter to do so given that he died of tuberculosis three decades before *Freedom to Learn*), we are merely using their approach to education to criticise Rogers’ perspective.

Freire’s Dialogical Theory of Action

Rogers was not the only educational theorist of the 1960s to be enamoured with the liberating premises of existentialism for education. A year before the publication of *Freedom to Learn*, another author hailing from Brazil was drafting a searing critique of the capitalist order and its consequence for education, the solution to which could only be found in the freeing expression

⁹⁰² Henk G. Schmidt, ‘Assumptions Underlying Self-Directed Learning May Be False’, *Medical Education* 34, no. 4 (2000): 243-245.

⁹⁰³ As in Sofie M.M. Loyens Joshua Magda, and Remy M.J.P. Rikers. ‘Self-directed learning in problem-based learning and its relationships with self-regulated learning.’ *Educational Psychology Review* 20, no. 4 (2008): 411-427.

of human agency. Thus, Paulo Freire's *Pedagogy of the Oppressed*, with its commitment to liberation, can be considered one of the chief works of critical pedagogy of the 20th century.⁹⁰⁴ Just as Kierkegaard can be considered Rogers' intellectual forefather, so the French existentialist philosopher Jean Paul Sartre can be considered Freire's. Freire refers to Sartre explicitly in *Pedagogy of the Oppressed* and as pointed out by Dale and Hyslop-Margison, also borrows his concept of agency to nourish his philosophy.⁹⁰⁵ Given their common existentialist roots, Rogers and Freire shared a commitment to education as a vehicle for liberation, as well as the view that freedom must come from individual commitment thereto rather than as a gift from the outside. As Freire stated, 'freedom is not an ideal located outside of man; nor is it an idea which becomes myth. It is rather the indispensable condition for the quest for human completion'.⁹⁰⁶ In many senses, one could argue that Freire's notion of human completion is not too different to Rogers' fully functioning person. In fact, Freire often referred to himself as a humanist, calling for educators to trust in the progressive nature of Man as Rogers had:

Trusting people is the indispensable precondition for revolutionary change. A real humanist can be identified more by his trust in the people, which engages him in their struggle, than by a thousand actions in their favor without that trust⁹⁰⁷

The result of this view, for both Rogers and Freire, was a stark criticism of traditional modes of education, or what Freire called 'banking education'. Both thinkers saw that the imposition of content from teachers onto students alienated the student from his own experience and emptied education of meaning:

Education is suffering from narration sickness. The teacher talks about reality as if it were motionless, static, compartmentalized, and predictable. Or else he expounds on a topic completely alien to the existential experience of the students. His task is to "fill" the students with the content of his narration - contents which are detached from reality, disconnected from the totality that engendered them and could give them significance. Words are emptied of their concreteness and become a hollow, alienated and alienating verbosity⁹⁰⁸

However, the similarities noted above between Freire and Rogers should not induce the reader into thinking that the two world perspectives are aligned. Far from it: not only do Freire and Rogers' version of existentialist and humanist thought differ, but Freire brought to the table an entirely different perspective on the Self, knowledge and the World that reduced Rogers' ideas on education to little more than 'middle-class narcissism', in the words of Donaldo Macedo.⁹⁰⁹ Firstly, although both authors found a source of inspiration in existentialism, Kierkegaard's quest for authenticity cannot be conflated with (later) Sartre's political stance against 'bad faith'. The Arch-Christian Kierkegaard's primary concern was drawing us into a solipsistic search for our inner Selves, a quest ending necessarily with God. Although Rogers did away with the religious conclusions of Kierkegaard's existentialism, his was a most definitely inward-looking philosophy. Rogers felt no need to shake men out of the stupor of inaction

⁹⁰⁴ Freire, *Pedagogy of the Oppressed*, 80.

⁹⁰⁵ John Dale and Emery J. Hyslop-Margison, *Paulo Freire: Teaching for Freedom and Transformation*. (New York: Springer, 2010), 122-126.

⁹⁰⁶ Freire, *Pedagogy of the Oppressed*, 47.

⁹⁰⁷ Freire, *Pedagogy of the Oppressed*, 60.

⁹⁰⁸ Freire, *Pedagogy of the Oppressed*, 72.

⁹⁰⁹ Donaldo Macedo in Freire, *Pedagogy of the Oppressed*, 18.

because he saw no structural cause for the latter, merely an interrelational one that could be fixed by embracing one's real Self within the psychological safe space of the Group Encounter. Once freed of the threats to the Self, Man would naturally tend towards actualizing without the need for political or societal upheaval. As described in Golomb, Sartre's existentialism, on the other hand, turned to political action when he realised that social life was rife with structural incentives for people to act in bad faith, thus barring the way to authenticity.⁹¹⁰ Therefore, for Sartre, the priority shifted from the achievement of authenticity to a call for political action that would create the social conditions under which authenticity could be achieved. Unlike Kierkegaard (and Rogers), Sartre became concerned with the fate of man and his freedom in society rather than man as a singular, isolated being faced only with God. This political stance paved the way for the Marxist-existentialist reconciliation that forms the backbone of Freire's philosophy of education.

No understanding of Freire would be complete without an understanding of dialectics; this Hegelian-cum-Marxist idea underlies all of his works. Unabashedly, Freire drew inspiration from a Marxist reading of the traverses of capitalism, borrowing in particular the idea of a dialectic emerging from the struggle between oppressors and oppressed. Freire saw in 'banking education' the imposition of the patterns of thinking of the oppressors onto the oppressed, thus alienating them from their own experience as human beings. He perceived in the primacy of the language of the oppressors in literacy and numeracy education the silencing of the voice of the oppressed in a manner very similar to what Negt termed '*sprachbarrieren*'.⁹¹¹ However, *contra* Marx, Freire did not believe that History was determined to end in a particular way – the dialectic did not have as a necessary conclusion the overthrow of the bourgeois oppressive system. Instead, sharing Sartre's belief in human agency rather than Marx's fatalism, Freire posited that liberation was to be a continuing and ever-present struggle. Siding with the oppressed in this historic battle, his call to action went through education. His theory of education was a dialogical one: teachers and students working together to unveil reality, critically re-creating knowledge. In Freire's world-view, there is a reality, its true nature is being hidden by the oppressing elites who do not wish to see it transformed, so they use a model of 'banking' education to deposit their oppressive stance into the minds of the students. By filling students' heads with elite propaganda, the oppressors deprive students of their creative power to transform the world.

Thus, in Freire's Dialogical Theory of Action, the Self is not an inward-looking being trapped in an idiosyncratic phenomenal bubble for which others are merely the mirrors of a personal quest for authenticity. Freire spoke against this sort of subjectivism, or what he called 'people without a World'.⁹¹² He stated instead:

The dialogical *I* however, knows that it is precisely the *thou* ('not-I') which has called forth his or her own existence. He also knows that the *thou* which calls forth his own existence in turn constitutes an *I* which

⁹¹⁰ Jacob Golomb, *In Search of Authenticity: from Kierkegaard to Camus* (London: Routledge, 1995), 90.

⁹¹¹ Negt, *Sociologische Phantasie*.

⁹¹² Freire, *Pedagogy of the Oppressed*, 50.

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has in its *I a thou*. The *I* and the *thou* thus become, in the dialectic of these relationships, two *thous* which become two *I*'s.⁹¹³

In other words, it is in the process of dialogue that the Self emerges, not as an idiosyncratic entity, but as the conjoined effort of two beings that become fully human in their joint action. Dialogue here is not meant in the sense intended by Rogers, as an expression of experiential feelings through which the 'real Self' can emerge, but instead in the sense of a dialectic with its thesis, antithesis and synthesis, which necessarily calls for action. The 'action' component of Freire's theory is as important as the dialogical aspect – it is neither sufficient that men should only reflect on their circumstances, nor is it desirable that they should act without reflection.⁹¹⁴ This relationship between reflection and action Freire called *praxis* in reference to later Marxism; this process was expressed in people's joint ability to *name* the world:

To exist, humanly, is to name the world, to change it. Once named, the world in its turn reappears to the namers as a problem and requires of them a new naming. Human beings are not built in silence but in word, in work, in action-reflection. But while to say the true word—which is work, which is *praxis*—is to transform the world, saying that word is not the privilege of some few persons, but the right of everyone. Consequently, no one can say a true word alone—nor can she say it for another, in a prescriptive act which robs others of their words. Dialogue is the encounter between men, mediated by the world, in order to name the world.⁹¹⁵

Here we can see *in fine* the value of Freire's theory in debunking Rogers' ideas of self-directed learning. Against Rogers' passive acceptance of the egocentric reality of the individual, opposed to Rogers' idea that the Self must adjust to its idiosyncratic experiential World in order to actualize, Freire restores education's power to transform by giving students and teachers the capability to reshape reality through words. Learning in Freire's world is still self-directed in the sense that only the individual can move himself into action, but this Self does not exist in isolation and cannot succeed in transforming the World without the dialogical relationship it has with other Selves that together become more than the sum of their parts. This mode of education, aptly named 'problem-posing education' by Freire answers more readily to the social-transformative ambitions of the intellectual forefathers of PBL. The interpretation of self-direction in PBL in the light of Freire's theory is not such an intellectual stretch to make, after all, Freire himself called for education to be anchored in social problems:

Those truly committed to liberation must reject the banking concept in its entirety (...). They must abandon the educational goal of deposit-making and replace it with the *posing of problems of human beings in their relations with the world*. "*Problem-posing*" education, responding to the essence of consciousness - intentionality - rejects communiqués and embodies communication. (...) Accordingly, the practice of problem-posing education entails at the outset that the teacher-student contradiction to be resolved.⁹¹⁶

This interpretation of problem-orientation is strongly reminiscent of the original ambitions of the *fagkritik* movement – in fact, some have linked the emergence of the Danish model to a prior experiment in Freire-inspired problem-posing project in work in Brasilia in the 1960s,

⁹¹³ Freire, *Pedagogy of the Oppressed*, 165.

⁹¹⁴ Freire, *Pedagogy of the Oppressed*, 51.

⁹¹⁵ Freire, *Pedagogy of the Oppressed*, 86.

⁹¹⁶ Freire, *Pedagogy of the Oppressed*, 79.

but the evidence is not conclusive enough to establish a formal link.⁹¹⁷ Some might point to the failure of Roskilde to enact meaningful social transformation in the wake of its endless battles with the political establishment as a sign of the failure of Freirean-type ideals of self-direction. Others, like Dale and Hyslop-Margison, might suggest on the contrary that in the face of the overwhelming and crushing neo-liberal discourse in education in the 21st Century, what education needs is more, not less Dialogical Theory of Action:

Outside the strictures of the global market, education in the neoliberal order conveys to students there are simply no longer any meaningful choices to be made. Throughout contemporary education curricula, and in a variety of ideologically manipulative ways, students are expected to prepare for an uncertain occupational future and are discursively convinced that such conditions are beyond the scope of their own political agency. Pedagogical tools of social critique such as critical thinking, lifelong learning, and literacy are all influence by the neoliberal shift toward instrumental instruction. As a result, schools fail to prepare students as democratic citizens who possess the necessary understanding and dispositions to decide politically between various social possibilities. Instead, students are portrayed as mere objects in history and inculcated with a consumer driven worldview devoid of imagination, hope, or alternative social visions.⁹¹⁸

Unfortunately, it could be argued that PBL is increasingly being shifted towards being a tool of instrumental instruction to the same extent as ‘critical thinking’ and ‘lifelong learning’. Rogers is hardly to blame for this shift, but his highly individualistic notion of self-direction which does away with any meaningful role for the teacher and denies the collective construction of reality may well have paved the way for making PBL easy pickings for instrumentalisation in a neo-liberal World Order.

Vygotsky’s Cultural-Historical Psychology

The situation would be dire indeed if the only retort to Rogers’ radical ideas of self-directed learning were even more radical philosophical propositions of Freire and his followers. As appealing as these ideas may be to those wishing for extreme change in current educational practices, the experience of the 70s showed precisely that the world was not ready for such a head-on collision of educational paradigms. Whether these ideas would make more or less headway now that the system has a seemingly unbreakable stranglehold on global education practices is not something that this thesis will tackle. Instead, we shall propose a different criticism of Rogers’ self-direction that not only revives PBL’s social transformative potential, but also aligns with current cognitive psychological understandings of learning. In this second critique of Rogers, we shall put forward Vygotsky’s theory of Cultural History to redefine self-directed learning as a social process.

Although the theories of Lev Vygotsky also to some extent hail from Marxist traditions, we have already pointed out in Chapter 4 that Vygotsky was more of a reluctant Marxist than a

⁹¹⁷ Dahms, in interview with the author, January 14, 2013. In support of this argument, Dahms cited a PhD thesis from Roskilde University from 1992. However, while said thesis shows striking similarities between the Brasilia project-based programme and that of the Danish model, it does not purport to make the historical link between the two. Henning Beck and Mette Müller. *The Room of Maneuver (sic) of an Institution: the case of the university*. Final Thesis, International Development Studies (Roskilde, Denmark: Roskilde University Centre, 1992).

⁹¹⁸ Dale and Hyslop-Margison, *Paulo Freire*, 136.

willing revolutionary *à la* Freire. Just after the Bolshevik revolution, together with his close associates Alexander Luria and Aleksej Leont'ev, Vygotsky founded an oft-forgotten school of thought known as Cultural-Historical Psychology. Despite its short-lived time in the limelight (having been banned from Soviet Russia in 1936), Cultural-Historical Psychology succeeded in producing both a rich theoretical and empirical legacy that survived Stalinist USSR, to be later rediscovered by American authors like Bruner.⁹¹⁹ Sitting at epistemological loggerheads with Rogers, Vygotsky and his circle posited that all human activity is woven into a web of social, cultural and historical artefacts that it cannot escape. Thus from a Vygotskian perspective it would make little sense to speak of peeling back the layers of social interference with the Self to return to organismic valuing since the Self *is* social and cannot be understood outside of its social, historical and cultural context. Thus, Vygotsky argued (against Piaget, but he could also have been talking to Rogers):

We see how different is the picture of the development of the child's speech and thought depending on what is considered to be a starting point of such development. In our conception, the true direction of the development of thinking is not from the individual to the social but from the social to the individual.⁹²⁰

Let us take Rogers' starting point that the Self is a series of concepts relating to the 'I' or 'me' to which values are ascribed. Vygotsky would agree with Rogers that concepts are not 'an isolated, ossified, and changeless formation, but an active part of the intellectual process'⁹²¹ but he would disagree with Rogers on the order of things, positing that concepts are 'constantly engaged in serving communication, understanding and problem-solving' rather than the other way around.⁹²² Thus, Vygotsky's concept of the Self serves communication while Rogers' concept of the Self is served by communication. The former posits the priority of social communication over the Self while the latter sees the Self as the primary entity receiving inputs from communication into its phenomenal field. In other words, the social precedes the individual in Vygotsky's world-view.

To explain the primacy of the social over the phenomenal, Vygotsky posited that language was the molding tool of the mind. Language was for Vygotsky the product of a historical and cultural context rather than a biological given or an individual construction – its first and foremost purpose was social, and only later did it become a tool to express inner thoughts.⁹²³ Because higher mental functions develop out of the internalization of language, which is socially constructed, positing an 'organismic' valuing process is nonsensical from a Vygotskian perspective.

The relative reversal of the individual and social from Rogers to Vygotsky has important consequences on the interpretation of self-directed learning. If the Self is a construction issued from essentially social processes, then it would follow that self-directed learning itself must be

⁹¹⁹ Thomas Slunecko and Martin Wieser, 'Cultural-Historical Psychology'. In *Encyclopedia Of Critical Psychology*, ed. Thomas Teo, 1st ed. (New York: Springer, 2014), 353.

⁹²⁰ Lev S. Vygotsky, *Thought and Language*, trans. Alex Kozulin (Cambridge, MA: The MIT Press, 1986), 36.

⁹²¹ Vygotsky, *Thought and Language*, 98.

⁹²² Ibid.

⁹²³ Laura E. Berk and Adam Winsler, *Scaffolding Children's Learning: Vygotsky and Early Childhood Education* (Washington D.C: National Association for the Education of Young Children, 1995), 21.

embedded in the social world too. We need not scratch our heads to figure out how this would work: Vygotsky gave us the answer in *Thought and Language* with the concept of the Zone of Proximal Development (ZPD).⁹²⁴ In the process of learning, students must be guided by subject-matter experts that can help the former structure the knowledge in their mind in the ZPD (see chapter 4). Vygotsky demonstrated through empirical experiments that spontaneous concepts arising in children's minds from common every-day experience in a bottom-up fashion were much richer experientially than scientific concepts, but children struggled to extract themselves from the grounded nature of their experience and produce from these generalizations and abstractions. Without the systematizing influence of instruction, students (children, in this case) would be incapable of making sense of the knowledge they acquired. The later application of Vygotsky's ideas to an adult population during the rise of constructivist psychology showed that the process was not significantly different for adult learners (see chapter 4). This finding does not mean that Vygotsky was advocating for top-down instruction. On the contrary, he saw learning as the 'systematic cooperation between the child and the teacher'.⁹²⁵ In this cooperative process, student needs to internalize the symbols (language) that emerge from the interaction, or what Barbara Rogoff called 'participatory appropriation'.⁹²⁶ The learning process is still self-directed in the sense that the process of internalization can only be done by the student – knowledge cannot be 'transferred' – but self-direction takes on a new meaning in this context: it no longer refers to the absolute and existential freedom to learn of Rogers, but instead to a self-drive to learn within a structured social environment.

Not only is this concept of self-directed learning far more aligned with the current state of the psychology learning and instruction (unsurprisingly, since Vygotsky was one of the sources of inspiration of constructivist psychology) than its Rogerian counterpart, but it is also in line with a Deweyan vision of the social responsibility of education. In some sense, this constitutes a shift in emphasis from *self-direction* to *self-direction*, meaning the formulation of a direction in learning by the students that acts as a commitment to the construction of shared meanings from which the self may rise to its greatest potential. Without advocating revolution, Vygotsky placed social processes at the core of education, and therefore a reform of education would potentially induce a change in the social processes that underlie it. Instead of passively (and it must be said, rather ineffectively) trying to fit the some necessarily lob-sided descriptive idea of what the World is in narrow discipline-bound and skills-focused curricula, in a very real sense, education could instead be the birthing place and incubator of the World we wish to see. Armed with Vygotsky and Freire's critique, we could give self-directed learning unprecedented normative power.

Self-direction and the future of PBL

⁹²⁴ Vygotsky, *Thought and Language*, 187.

⁹²⁵ Vygotsky, *Thought and Language*, 148.

⁹²⁶ Barbara Rogoff, 'Observing Sociocultural Activity On Three Planes: Participatory Appropriation, Guided Participation and Apprenticeship'. In *Pedagogy and Practice: Culture And Identities*, ed. Kathy Hall, Patricia Murphy and Janet Soler (London: Sage, 2008), 58-74.

If we are to support the development of PBL into the future as an educational method capable of social transformation in the Deweyan tradition, then we must take heed of the critique of radical self-directed learning laid out above. Firstly, from a pedagogical standpoint, because there is simply no evidence that students left to their own devices will have the capacity to make sense of their learning world – it seems that the freedom to learn cannot be taken without the helping hand of teachers. Secondly, from a social-transformative perspective, because the assumption that our social world is merely an aggregation of irreconcilable personal experience sets education dangerously free of responsibility towards the system as a whole, in its most extreme version negating the very existence of that system and thus making social transformation impossible. PBL must recognise its Deweyan heritage and accept that its strongest asset against traditional modes of education, whether one calls them ‘banking’, ‘top-down’ or ‘teacher-centric’, is a version of self-directed learning that is pedagogically realistic and socially driven.

Rehabilitating the Teacher

If PBL is to meaningfully impact its students, then PBL educators must design curricula that take full account of the scaffolding role of teachers in a social understanding of the learning process. That is to say, we must focus on developing students’ drive to learn within flexible but structured learning environments rather than focusing on effacing the teacher from the learning process and leaving students to swim in the stream on their own. In the 21st century, students drown from a tender age in a chaotic flow of over-information, which is both educationally unhelpful and socially disempowering. Leaving them to their own devices in a Rogerian environment would not only be pedagogically and psychologically ineffective, it would also be an abdication of our duty to educate in favour of an increasingly broken social system which produced the chaos in the first place. Left alone, the student will not encounter his ‘real self’ in some idealistic quest for knowledge that responds to his organismic needs. Instead, hurled into an academic World that teeters on the edge of epistemological nihilism, confronted with the incompatible ontological propositions of the various disciplines, our students will most likely feel a deep, disconcerted state of anxiety that can only be alleviated by the trusting relationship with a teacher as an intellectual leader of the class, to use Deweyan terminology. Students feel better able to deal with temporarily losing the epistemological grounds beneath their feet if they know that their teacher will not let them drown. For those students who refuse to let go of their preconceptions and certainties, the teacher is there to challenge and question, to help the student deconstruct his ideas until he can see their underlying assumptions. As Dewey pointed out, the ability to be both the devil’s advocate and the helping hand is a skill anchored in deep knowledge of the contents of the course and a thorough understanding of the process of learning itself.⁹²⁷ That sort of knowledge takes time and experience to acquire. Some might say it constitutes a professional calling to the same extent as any other academic profession such as physicist or philosopher.

⁹²⁷ Dewey, *How We Think*, 272-277.

And yet, despite the crucial role of the teacher as a guide, mentor and intellectual leader, it seems that PBL tutors are often hired from the most cost-effective end of the academic pool, either junior faculty straight out of their Bachelor or Masters programme, or even senior Bachelor students. Although there are truly talented exceptions, these young and inexperienced tutors generally have very little content knowledge, almost no life experience and lack the confidence and clout that makes a teacher an intellectual leader. They effectively become delivery boys and girls for PBL course coordinators who, not having much time for their courses in the face of overwhelming publication pressures, simply dump a tutor manual in their hands, listing learning goals and mandatory literature, and leave them on their way knowing precious little more than the students they are supposed to guide.⁹²⁸ Unfortunately, the moment these young tutors reach enough knowledge and experience to be effective (and therefore more expensive) they often find themselves replaced by cheaper options.

Therefore, the first order of the day if we are to invest in PBL as a method for significant learning is to rehabilitate the tutor as a Deweyan teacher. This proposition is unlikely to find much support given the current climate for cost-saving in education, but if education policy-makers are truly concerned about giving the next generation a real, meaningful education, then there is little choice in this matter. Doing anything else whilst claiming to education ‘twenty-first century citizens’ is a farce.

Meaningful Social Transformation

Rehabilitating the teacher alone will not suffice; the pedagogical benefits that this will bring cannot be divided from the societal mission of education (lest it becomes a mere instrument). This means that we must also work towards a mode of education that acknowledges the collective construction underlying social reality, a ‘problem-posing’ education in Freire’s words. Calling for revolution has not been historically particularly helpful, therefore social change should be brought about by a progressive reconfiguration of the order of the *status quo*. Problem-based learning must open an epistemic void before the feet of our students by confronting them with the limits of their knowledge. Our mission as educators is not to let our students comfortably wade in the shallow waters of knowledge but to tug them further out to sea until they find that with their teacher’s help, they have learned to swim. This should be an uncomfortable process, sometimes even painful – deep learning is never easy and sometimes constitutes a rather unpleasant experience. Rampant consumerism has accustomed our students to push-button solutions to just about every problem. Unfortunately, when students begin to see education as a purchased product and the government treats universities like corporations, elements of market logic such as short-term returns, customer satisfaction and ease-of-use come into play which should have no place in education.

⁹²⁸ This process is described in some detail in Moust, van Berkel and Schmidt, *Signs of Erosion*, 671-672. This tendency is not exclusive to Maastricht University, however. The author has witnessed it in many of the PBL-practicing institution she has visited, most often justified on the dubious grounds that PBL tutors need possess no expertise in the subject-matter.

This means that we must construct PBL problems with several layers of analysis in mind. The first layer is a more superficial and ‘facts-based’ level of understanding, which students usually arrive at on their own since it corresponds with the way they have approached knowledge since primary school. This positivist approach is usually where conventional education and poorly done PBL stops. Good PBL problems should however contain a second layer of analysis, challenging those ‘facts’ with opposing theories and viewpoints, serving as a trigger for students to confront differing opinions on what seemed at first like straightforward issue. Socially-transformative PBL possesses a third layer that challenges the premises of the problem-situation and introduces critical elements into the discussion. The tutor will ask students to discuss and deconstruct the assumptions about knowledge made in the problem, revealing its social context. The process of tackling the third layer of a problem is a deeply transformative social process with which each group of students will engage in a different way. It is almost impossible for a course coordinator to jot down the learning objectives that should come out of this level of analysis since each student group finds its own direction therein, thereby reinforcing the need for a Deweyan teacher that can respond on the spot to the chosen direction. Some might criticise this approach as only suited to the study of philosophy, but the three-layer approach is just as valid for the humanities, social sciences and natural sciences since all knowledge is fundamentally social. Such an approach to PBL would constitute a truly socially-transformative approach to self-directed learning.

Thus, putting PBL back into its ‘social context’ does not mean simply using problems from real life to illustrate theories, especially if the focus is first and foremost on an uncritical absorption of those theories. Neither does it mean simply throwing students into the ‘real world’ to conduct observations and interviews like scientists observing lab-mice. Social transformation must go through the deconstructive process outlined above that will reveal, in Vygotskian terms, the social fabric underlying the problems. Once that social fabric is understood, then students, together with teachers and with the communities whose lives constitute the ‘problems’ for PBL, can find the power to ‘name the World’ (in Freire’s words) in the direction they feel is right.

Although this ideal of self-direction in PBL may seem far-fetched in a world so utterly dominated by an instrumental language of education, a re-reading of Dewey’s *Democracy and Education* would show to the reader that we are not the first, and hopefully not the last to wish this for education.

Conclusion

The third part of this treatise has concentrated on the emergence of a debate surrounding the definition and implementation of PBL from a historical, philosophical and organizational standpoint. The debate was sparked by Aalborg University’s claim that their problem-oriented project-based learning model is in fact a version of PBL because it shares common principles with McMaster’s model. To untangle this issue, we have delved deep into the roots of the Aalborg model, beginning with Roskilde University’s revolutionary education programme and

ending with Aalborg's appropriation of the term PBL in the 1990s. This discussion served as the basis for an analysis of the core principles of PBL; the nature of problems and the nature of the educational process. We concluded from there that while the Aalborg model cannot be equated with the McMaster and Maastricht model, the definition of PBL is currently locked in a boundary dispute in which one side is arguing from a scholarly perspective and the other from a practice-based perspective and neither seems willing to compromise. We have showed that this disputed opened the door wide for a free-for-all in the interpretation of PBL, leading to the instrumentalisation of the method in many institutions around the world. To resolve this issue and give PBL its social-transformative potential back, a new approach was necessary. We chose to focus on self-directed learning, as the core historical feature of PBL to suggest this new approach. Deconstructing self-directed learning's existential underpinnings, we were able to suggest alternative analyses with socially transformative power. Once applied to PBL, two issues emerged: the need to rehabilitate teachers in PBL and the need to provide problems that trigger socially-transformative self-direction.

This lengthy and complex argumentation is hopefully only the beginning of a critical research programme on PBL that will bring an end to the prevalence of descriptive, uncritical reportings of PBL implementation in the literature. This call for a return to critical pedagogy should not be the exclusive remit of PBL scholars but should instead stretch to all confines of education, particularly fields such as the internationalisation of education, the rebirth of liberal arts in Europe and the ebb and flow of the distinction between applied and academic sciences. Ultimately it is every educator's responsibility to make sure that education does not become a disempowering instrument in the hands of people whose world view is so remote from the lived experience of learners.

Part 3: References

Journals & Books

- Adolphsen, Jes. *I Satte os I Jeres Baner: Interviews med 19 vigtige personer I AUC historie* [You put us in your tracks: Interviews with 19 important persons in AUC history]. Aalborg: Aalborg Universitetsforlag, 1984.
- Andersen, Anders Siig and Simon B. Heilesen. *The Roskilde Model: Problem- Oriented Learning and Project Work*, Switzerland: Springer, 2015.
- Andersen, Anders Siig and Tinne Hoff Kjeldsen. 'A Critical Review of the Key Concepts in PPL'. In *The Roskilde Model: Problem- Oriented Learning and Project Work*. edited by Anders Siig Andersen and Simon B. Heilesen, 17-36. Switzerland: Springer, 2015.
- Andersen, Anders Siig and Tinne Hoff Kjeldsen. 'Theoretical Foundations of PPL at Roskilde University'. In *The Roskilde Model: Problem- Oriented Learning and Project Work*. Edited by Anders Siig Andersen and Simon B. Heilesen, 3-16. Switzerland: Springer, 2015.
- Aronson, Elliot and Alex Gonzales. 'Desegregation, Jigsaw and the Mexican-American experience'. In *Eliminating Racism*, edited by Phyllis E. Katz and Dalmas A. Taylor. New York: Springer, 1988.
- Barrows, Howard S. and Robyn M. Tamblyn, *Problem-based learning: an approach to medical education*. New York: Springer Publishing Company, 1980
- 'Basisfilosofie Achte Medische Faculteit'. *Medische Contact* 27 (1972): 879-84.
- Beck, Henning and Mette Müller. *The Room of Maneuver (sic) of an Institution: the case of the university*. Final Thesis, International Development Studies Roskilde, Denmark: Roskilde University Centre, 1992.

REVOLUTIONS & RE-ITERATIONS

- Berk, Laura E. and Adam Winsler. *Scaffolding Children's Learning : Vygotsky and Early Childhood Education*. Washington D.C.: National Association for the Education of Young Children, 1995.
- Berthelsen, Jens, Knud Illeris and Sted Clod Poulsen. *Projektarbejde : erfaringer og praktisk vejledning*. Holstebro: Borgen, 1977.
- Bin Othman, Hasyamuddin, Abdullah Bin Sulaiman, Nor Ratna Binti Masrom, and Yahya Bin Buntat. 'The Instillation of Employability Skills Through Problem Based Learning Model at Malaysia's Higher Institution'. Paper presented at the International Conference on Teaching and Learning in Higher Education, in Kuala Lumpur, Malaysia, November 23-25, 2009.
- Blankertz, Herwig. 'Pädagogische Theorie und empirische Forschung' [Pedagogical theory and empirical research]. Cited in *Kostenfrei Online-Lehrmittel*, edited by Carl-Christian Fey. Bad Heilbrunn: Julius Klinkhardt, 2015.
- Bransen, Jan. 'Verstehen and erklären, philosophy of,' in *International Encyclopedia of the Social and Behavioral Sciences*, edited by N.J. Smelser and P.B. Baltes. Oxford: Elsevier Science Ltd, 2001.
- Brockett, Ralph G. and Robert C. Donaghy. 'Beyond the Inquiring Mind: Cyril Houle's Connection to Self-Directed Learning'. Paper presented at Adult Education Research Conference, Knoxville, TN: The University of Tennessee, 2005. <http://newprairiepress.org/aerc/2005/papers/68/>
- Clausen, Allan. *Kampen for et nordjysk universitet* [The Battle for a North Jutland University]. Aalborg: Aalborg Universitetsforlag, 1984.
- Dahl, Bettina, Jette Egelund Holgaard, Hans Hüttel and Anette Kolmos. 'Students' Experiences of Change in a PBL Curriculum'. *International Journal of Engineering Education* 32, no. 1(B): 384-395.
- Dale, John and Emery J. Hyslop-Margison. *Paulo Freire: teaching for Freedom and Transformation*. New York: Springer, 2010.
- De Graaff, Erik, and Anette Kolmos. 'Characteristics of problem-based learning'. *International Journal of Engineering Education* 19, no. 5 (2003): 657-662.
- De Graaff, Erik, and Anette Kolmos. 'History Of Problem-Based And Project-Based Learning". In *Management Of Change: Implementation Of Problem-Based And Project-Based Learning In Engineering*, edited by Erik de Graaff and Anette Kolmos, 1st ed., 1-8. Rotterdam: Sense Publishers, 2007.
- De Pinho, Luis A., Fabio B. Mota, Mariza V. F. Conde, Luiz A. Alves, and Renato M. Lopes. 'Mapping Knowledge Produced on Problem-Based Learning between 1945 and 2014: A Bibliometric Analysis' *Creative Education* 06, no. 06 (2015): 576-584.
- Dewey, John. *Democracy and Education*. Oxford, UK: Benediction Classics, 2011.
- Dewey, John. *How we Think*. Lexington MA: D.C. Heath and Company, 1933.
- Fagan, Thomas K. 'Eiserer, Paul E.' In *Historical Encyclopedia of School Psychology*. Edited by Thomas K. Fagan and Paul G. Warden, 121-122. Westport, CT: Greenwood Press, 1996.
- Frankl, Viktor. *Man's Search for Meaning*. Boston, MA: Beacon Press, 2006.
- Freire, Paulo. *Pedagogy Of The Oppressed*. New York: Bloomsbury, 2000.
- Golomb, Jacob. *In Search of Authenticity: from Kierkegaard to Camus*. London: Routledge, 1995.
- Hansen, Else. *En Koral I Tidens Strøm*. [A Coral in the Current of Time] Frederiksberg: Roskilde Universitetsforlag, 1997.
- Hergenhahn, Baldwin R. *An Introduction To The History Of Psychology*. 4th ed. Belmont, CA: Wadsworth Pub. Co., 2001.
- Holgaard, Jette E., and Anette Kolmos. 'Group Or Individual Assessment In Engineering, Science And Health Education'. In *Research On PBL Practice In Engineering Education*, 1st ed., edited by Xiangyun Du, Erik de Graaff and Anette Kolmos, 57-70. Rotterdam: Sense Publishers, 2009.
- Houle, Cyril O. *The Inquiring Mind*. University of Wisconsin Press: Madison, 1961.
- Hultengren, Eva. *Problemorientering, projektarbejde og rapportskrivning* [Problem-orientation, Project-work and Report writing]. Aalborg: Aalborg Universitetsforlag, 1979.
- Illeris, Knud. *Problemorientering og deltagerstyring: oplæg til en alternativ didaktik* [Problem-orientation and participant direction: presentation of an alternative didactic]. Copenhagen: Munksgaard, 1974.
- Illeris, Knud 'The Organization of studies at Roskilde University, the concept, practice and problems of project organization'. *CRE-Seminar 19th – 24th June 1992*.
- Jonas, Steven. 'The case for change in medical education in the United States'. *The Lancet* 324, no. 8400 (1984): 452- 454.
- Jung, Carl. 'Über die Archetypen des kollektiven Unbewussten' [Archetypes of the Collective Unconscious], *Von den Wurzeln des Bewusstseins*. Zurich: Rascher, 1954.
- Kaufman, Arthur. *Implementing Problem-Based Medical Education*. New York: Springer Pub. Co. 1985.
- Kierkegaard, Søren. *Concluding Unscientific Postscripts to Philosophical Crumbs*. Translated by Alastair Hannay. New York: Cambridge University Press, 2009.
- Kierkegaard, Søren. *The Sickness Unto Death*. Translated by Alistair Hannay. London: Penguin Classics, 2004.

CHAPTER 6: SELF-DIRECTED LEARNING AS THE HEART OF PBL

- Kilpatrick, William H. 'The Project Method: The Use of the Purposeful Act in the Educative Process', *Teachers College Record* 19, no. 4 (1918): 319-335.
- Kjærdsdam, Finn and Stig Enemark. *The Aalborg Experiment: Project Innovation in University Education*. Aalborg: Aalborg University Press, 1994.
- Klemmensen, Børge. 'Sølvbryllup I oprøret, - og ligusterhæk ensretning og ukritisk tilpassethed hos afkommet' [The silver anniversary of rebellion – and privet hedges, regimentation and uncritical conformity in the offspring], in *RUC i 25 År* [RUC is 25 years old]. Edited by Henrik Toft Jensen, 39-53. Frederiksberg: Roskilde Universitetsforlag, 1997.
- Knoll, Michael. 'The Project Method: Its Vocational Education Origin and International Development', *Journal of Industrial Teacher Education* 34, no. 3 (1997), <http://scholar.lib.vt.edu/ejournals/JITE/v34n3/Knoll.html?re>
- Knoll, Michael. 'A Marriage on the Rocks: An Unknown Letter by William H. Kilpatrick about His Project Method'. *Online Submission*. (2010) <http://eric.ed.gov/?id=ED511129>
- Knowles, Malcolm S. *Self-directed learning: a guide for learners and teachers*. Chicago, IL: Association Press, 1975.
- Knowles, Malcolm S. *The making of an adult educator: an autobiographical journey*, 1st ed. San Francisco, CA: Jossey-Bass, 1989.
- Kolmos, Anette. 'Reflections on project work and problem-based learning'. *European Journal of Engineering Education* 21, no. 2 (1996): 141-148.
- Kolmos, Anette, Flemming K. Fink and Lone Krogh, 'The Aalborg Model – Problem and Project Based Learning' in *The Aalborg PBL Model: progress, diversity and challenges*, edited by Anette Kolmos, Flemming K. Fink and Lone Krogh. Aalborg: Aalborg University Press, 2004.
- Kwan, Chiu-Yin, and Leslie Tam. 'Hybrid PBL-What Is in a Name?' *Journal of Medical Education* 13, no. 3 (2009): 76–82.
- Loyens, Sofie M.M., Joshua Magda, and Remy M.J.P. Rikers. 'Self-directed learning in problem-based learning and its relationships with self-regulated learning.' *Educational Psychology Review* 20, no. 4 (2008): 411-427.
- Majoor, Gerard and Han Aarts. 'A role for problem-based learning in higher education in the developing world'. In *Lessons from Problem-based Learning*. Edited by Henk van Berkel, Albert Scherpbier, Harry Hillen and Cees van der Vleuten, 249-258. Oxford, UK: Oxford University Press, 2010.
- Maslow, Abraham H. 'A theory of human motivation.' *Psychological review* 50, no. 4 (1943): 370-396.
- Michaelsen, Larry K., Arletta Bauman Knight and L. Dee Fink. *Team-based learning: a transformative use of small groups*. Westport, CT: Praeger, 2002.
- Mohd Yusof, Khairiyah, Zaidatun Tasir, Jamalludin Harun, and Syed Ahmad Helmi. 'Promoting Problem-Based Learning (PBL) in Engineering Courses at the Universiti Teknologi Malaysia.' *Global Journal of Engineering Education* 9, no. 2 (2005): 175–84.
- Moust, Jos H.C., Henk J.M. van Berkel, and Henk G. Schmidt, 'Signs of Erosion: Reflections on Three Decades of Problem-Based Learning at Maastricht University'. *Higher Education* 50, no. 4 (2005): 665–83.
- Negt, Oskar. *Soziologische Phantasie und Exemplarishes Lernen: Zur Theorie und Praxis der Arbeiterbildung* [Sociological Imagination and Exemplary Learning: Toward a Theory and Practice of Worker's Education]. Frankfurt am Main: Europäische Verlagsanstalt, 1971.
- Negt, Oskar and Alexander Kluge. *Public Sphere and Experience: towards an Analysis of the Bourgeois and Proletarian Public Sphere*. Translated by Peter Labanyi, Jamie Owen Daniel and Assenka Oksinoff. Minneapolis: University of Minnesota Press, 1993.
- Neufeld, Victor R., and Howard S Barrows. 'The 'McMaster Philosophy': an Approach to Medical Education'. *Journal of Medical Education* 49 (1974): 1040–50.
- Nielsen, Henrik, Jørgen Poulsen and Per Salomonsen. *SAMF BASIS – en vurdering af den samfundsvidenskabelige basisuddannelse ved AUC 1974/75 og 75/76*. [Social Science Basis-year – an assessment of the social science basis-education at AUC 1974/75 and 75/76.]. Det samfundsvidenskabelige fakultetsnævn, 2. udgave, December 1976. Aalborg: Aalborg Universitetscenter, 1976.
- Nissen, Thomas. *Indlæring og pædagogik*. Copenhagen: Munksgaard, 1970.
- Nooman, Zohair M, Henk G. Schmidt, and Esmat S. Ezzat (editors). *Innovation In Medical Education*. New York: Springer Pub. Co., 1990.
- Perrenet, J.C., Peter A.J. Bouhuijs, and J.G.M.M. Smits. 'The Suitability of Problem-Based Learning for Engineering Education: Theory and Practice.' *Teaching in Higher Education* 5, no. 3 (2000): 345–58.
- Rogers, Carl R. *Client-Centred Therapy*. Kindle Edition. New York: Constable & Robinson, 2003.
- Rogers, Carl R. *Counselling and Psychotherapy: Newer Concepts in Practice*. Cambridge, MA: Houghton Mifflin Company, 1942.

REVOLUTIONS & RE-ITERATIONS

- Rogers, Carl R. *On Becoming a Person*. Boston, MA: Houghton Mifflin Company, 1961.
- Rogers, Carl R. *Freedom to Learn*. Columbus, OH: Merrill, 1969.
- Rogoff, Barbara. 'Observing Sociocultural Activity On Three Planes: Participatory Appropriation, Guided Participation And Apprenticeship'. In *Pedagogy And Practice: Culture And Identities*, 58-74. Kathy Hall, Patricia Murphy and Janet Soler. London: Sage, 2008.
- Sartre, Jean-Paul. *L'être et le Néant – Essai d'ontologie Phénoménologique*. Paris: Gallimard, 1943.
- Savery, John R. 'Overview of Problem-Based Learning: Definitions and Distinctions.' *Interdisciplinary Journal of Problem Based Learning* 1, no. 1 (2006): 9–20.
- Savin-Baden, Maggi and Claire Howell Major, *Foundations of Problem-Based Learning*, Maidenhead: Open University Press, 2004.
- Schmidt, Henk G. 'Leren met problemen, een inleiding in probleemgestuurd onderwijs [Learning with problems, an introduction to problem-based learning]'. *Handboek voor de onderwijspraktijk*, Deventer: Van Loghum Slaterus, 1979.
- Schmidt, Henk G. 'Problem-Based Learning - Rationale and Description'. *Medical Education* 17, no. 1 (1983):11-16.
- Schmidt, Henk G. 'Probleemgestuurd onderwijs en projectonderwijs: overeenkomsten en verschillen [Problem-based learning and the case study method: similarities and differences]'. *Tijdschrift voor Hoger Onderwijs* 4 (1986): 38-46.
- Schmidt, Henk G. 'Foundations of Problem-Based Learning: Some Explanatory Notes.' *Medical Education* 27, no. 5 (1993): 422–32.
- Schmidt, Henk G. 'Assumptions Underlying Self-Directed Learning May Be False.' *Medical Education* 34, no. 4 (2000): 243-245.
- Servant, Virginie F.C. and Claus M Spliid. 'The construction of teacher roles at Ålborg University Centre: a historical perspective 1972-1982'. Unpublished manuscript (2015).
- Siggaard Jensen, Hans and Knud Knudsen. 1984. *Udforskning* [Exploration]. Aalborg: Aalborg Universitetsforlag, 1984.
- Slunecko, Thomas, and Martin Wieser. 'Cultural-Historical Psychology'. In *Encyclopedia Of Critical Psychology*, 352-356. Edited by Thomas Teo. New York: Springer, 2014.
- Spaulding, William B. *Revitalizing Medical Education, McMaster Medical School the Early Years 1965-1974*. Hamilton, ON: B.C. Decker Inc, 1991.
- Stentoft, Diana, Meg Duroux, Trine Fink and Jeppe Emmersen. 'From cases to projects in problem-based medical education.' *Journal of Problem Based Learning in Higher Education* 2, no 1 (2014): 45-62.
- Sørensen, Preben. *Aalborg Universitet i 40 år: udviklingen belyst i tal*. Aalborg: AAU Kommunikation, 2014.
- Thomsen, Erik. 'The Danish Institute for Educational Research.' *Applied Psychology: An International Review* 10, (1961): 23–29.
- Tough, Allan. *The Adult's Learning Projects*. Institute for Studies in Education: Toronto, 1971.
- Vygotsky, Lev S. *Thought and Language*. Translated by Alex Kozulin. Cambridge, MA: The MIT Press, 1986.
- Wang, Dora L. and Shannan L. Carter, *The Daily Practice of Compassion: A History of The University of New Mexico School of Medicine, Its People and Its Mission 1964-2014*, Albuquerque, NM: UNM Press; 2014.
- Whitehead, John, S. 'Denmark's Two University Centres: The Quest for Stability, Autonomy and Distinctiveness', *Higher Education* 10, no1 (2007): 89-101.
- Woods, Donald R. 'Issues in Implementation in an Otherwise Conventional Programme.' In *The Challenge of Problem-Based Learning*, edited by David J. Boud and Grahame Feletti, 124-127. New York: St. Martin's Press, 1991.
- Zhou, Chunfang, Anette Kolmos and Jens F.D. Nielsen. 'A Problem and Project-Based Learning (PBL) Approach to Motivate Group Creativity in Engineering Education', *International Journal of Engineering Education* 28, no. 1, (2012): 3-16.

Archive Material

- Aalborg Universitetscenter Aarsberetning* [Annual Report], Aalborg: Aalborg Universitetscenter, 1976.
- Anon. 'Studienævn enig i Erling Olsens Roskilde-kritik' [Study Council agrees with Erling Olsen's Roskilde-critique], *Frederiksborg Amts Avis* (Copenhagen), February 9, 1974. RU-History Collection Mag RHS a 006. Roskilde University Library, Roskilde.
- Bayer, Karin. 'On The Development Of The Idea Of Project-Organization At The Natural Science Basic Studies Course, RUC', Conference paper from 1976, RU-History Collection Mag RHS a 104. Roskilde University Library, Roskilde.
- Bremer, Joost and Wynand Wijnen. 'Over Doelstelling En Werkwijze Van Onderwijsgroepen', memorandum from 1975. Rijksarchief in Limburg, 07.C06 - inventaris 90. Maastricht, Netherlands.

CHAPTER 6: SELF-DIRECTED LEARNING AS THE HEART OF PBL

- Dalgaard, Svenning. 'De råber 'svin' efter professoren' [They cry 'pigs' after their professors], *Aarhus Stiftstidende* (Aarhus), March 17, 1974. RU-History Collection Mag RHS a 006. Roskilde University Library, Roskilde.
- Education Programme Committee. 'Phase I Programme: 1969'. Memorandum from 1968. Educational Programme Committee - 1966-1967 - HHS/ FHS Archives, Box 232.4;1. McMaster University, Hamilton, ON.
- Evans, John R. 'General Objectives'. Memorandum from 1966. Objectives of the Faculty School of Medicine - HHS/FHS Archives, Box 145.8;1. McMaster University, Hamilton, ON.
- Haastrup, Niels. Unpublished report from 1974. 'The Making Of Roskilde University-Centre: Background, Principles And Problems', RU-History Collection, Mag RHS a 353, Roskilde University Library, Roskilde.
- Interimstudienævnet for det humanistiske hovedområde, 'Betænkning Om Den Humanistiske Basisuddannelse' [Report on Humanities Basic Education]. Report from 1972, RU-History Collection Mag RHS a 145, Roskilde University Library, Roskilde.
- Muckle, T.J. 'Phase II 1971-1972, Unit 2, Ischaemia'. Student unit guide from 1971 retrieved from G.R. Norman's personal files. McMaster University, Hamilton, ON.
- Mustard, J. Fraser. 'Objectives of the Faculty of Medicine'. Letter to D.L. Sackett from November 11, 1968. Educational Programme Committee - 1968 - HHS/ FHS Archives, Box 145.8;1. McMaster University, Hamilton, ON.
- Roskilde Universitetscenter, 'Betænkning Om Samfundsvidenskabelig Basisuddannelse' [Report on Social Sciences Basic Education]. Report from 1972. Roskilde, Denmark. RU-History Collection Mag RHS a 183. Roskilde University Library, Roskilde.
- Sackett, Dave L. 'Objectives Of The Faculty Of Medicine Of McMaster University'. Draft report from January 1969. Hamilton, Ontario, 1969. Objectives of the Faculty School of Medicine - HHS/FHS Archives; Box 145.8;2. McMaster University.
- Smith, Kinsey, 'Why Make A Change In Phase III?' Essay addressed to the Education Committee from 10th November 1980. Educational Programme Committee - 1980 - HHS / FHS Archives: Box 233.3;4. McMaster University, Hamilton, ON.
- Spaulding, William. 'The Undergraduate Medical Curriculum: McMaster University' Report from October 31, 1968. Objectives of the Faculty School of Medicine - HHS/FHS Archives, Box 145.8;1. McMaster University, Hamilton, ON.
- SR Nyt*, årg. 3 nr. 17/18, 1977 (Ålborg: Ålborg Universitetscenter, 1975-1982) p.25; Center Nyt (Ålborg: Informationsudvalg Ålborg Universitetscenter, 1975-1982).
- Walsh, William. 'Attitudes in Medicine - A Draft Submission', Draft memorandum from January 11, 1968. Educational Programme Committee - 1968 - HHS/ FHS Archives, Box 232.4;4. McMaster University, Hamilton, ON.

Online References

- 'Aalborg Centre for Problem-Based Learning', Aalborg University, accessed May 18, 2016, <http://www.ucpbl.net/>.
- 'About us', *The Aalborg Centre for Problem Based Learning in Engineering Science and Sustainability under the auspices of UNESCO*, accessed December 2015. <http://www.ucpbl.net/about/>
- 'Employability Skills WSQ', Singapore Workforce Development Agency. Accessed May 18, 2016, <http://www.wda.gov.sg/content/wdaweb/L207-AboutWSQ/L301A-FoundationalSkills/L401A-EnglishEmployabilitySkills.html>
- 'Masters in Problem-based Learning in Engineering and Science', Aalborg University, accessed May 10, 2016, <http://www.mpbl.aau.dk/>.
- 'Noget om arbejdsulykker', Roskilde University, accessed May 18, 2016, https://safir.ruc.dk/sites/rap/pub/search.html?doaction=showfull&data=keyno_list=x25105934x_format=pub-full_language=da
- Koring, Bernhard. 'Konzepte der Erziehungswissenschaft'. *TU Chemnitz-Zwickau*. Last modified April 6, 1997. <http://neibecker.wiwi.uni-karlsruhe.de/breiter/fertig/chemnitz/homesem.htm>
- Thompson, Peter 'The Frankfurt School, Part 3: Dialectic Of Enlightenment'. *The Guardian*, Published 8 April 2013. <http://www.theguardian.com/commentisfree/2013/apr/08/frankfurt-school-dialectic-of-enlightenment?INTCMP=sfl>.

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Summary of Findings

Problem-based learning (PBL) is arguably one of the most successful educational inventions of the twentieth century. Unlike many other education experiments of the post-war period, it has thrived such that over 500 schools and higher education institutions, in almost all fields of study, claim to make use of PBL in some form or another. The interest in scientific investigation of PBL is such that searching ‘problem-based learning’ in Google Scholar will bring up 360,000 results. The basic premise of PBL is that students’ learning begins in a confrontation with a realistic problem, tackled in a small-group setting, under the guidance of a tutor. Given the importance of self-study in PBL, the number of lectures is necessarily limited to allow time for students to absorb relevant literature and theories in a self-directed manner.

The History of the method has been handled in a haphazard manner in the scientific literature such that most of what is written about its origins and development is based on secondary accounts and analogical reasoning devoid of empirical verification. This thesis contributes to the field by proposing the first systematic historical account of the intellectual history of PBL. This was achieved by using Whewell’s inductive historical analysis method to triangulate archival, oral history and materials published around the time of the founding of the first PBL schools. The temporal scope of this thesis was centred around the founding years of the first two schools to use PBL, during which most of the principles were developed, namely at McMaster University School of Medicine, from 1963 until 1972, and at Maastricht University Faculty of Medicine, from 1974 to 1980. For both of these schools, the thesis first set the scene by drawing a historical picture of the introduction and development of their respective PBL curricula. After presenting the ‘founding fathers’ and their contributions to PBL, we outlined the curriculum and the specificities of the PBL tutorials in each, such as tutor selection and training, length and types of problems, tutorial structure, interdisciplinary unit or ‘block’ curriculum construction, assessment, the training of medical skills and other relevant aspects. After this historical analysis, the thesis focused on presenting a coherent and comprehensive account of the theoretical propositions and the influences from educational practice that formed the background against which PBL was developed. Each philosophical or psychological theory put forward in this thesis was linked to debates going on at McMaster or Maastricht recorded through minutes of meetings, memoranda and other archive materials. For each theory, the thesis evaluated its historical importance in the development of PBL, meaning the extent to which people at McMaster and Maastricht explicitly claimed that they were sourcing their ideas from it, or the extent to which the jargon of the theory could be found in the language used by the founders. Then, the central tenets of the theories were exposed with reference to the original writings of the relevant authors in a bid to explain how these tenets relate to the principles of PBL. This was done by comparing the original texts with the historical practice of PBL in the institutions under study. When intellectual disputes were unearthed, such as the argument between humanist and behaviourist principles of assessment at McMaster and the debate

between the focus on reasoning process and content in problems at Maastricht, the theories underlying both positions were presented and placed in their historical context, the evolution of the debate over the years was chronicled and its consequences on the development of PBL explained.

Although this would have been enough for a comprehensive account of the origins of PBL, this thesis chose to go further by addressing two questions central to the current state of PBL. Firstly, the treatise provided a historical, philosophical and organizational analysis of the claim levied by Aalborg University since the 1990s that its project-work model is a version of PBL. Given that its model dates from 1974, this would mean that it should be considered among the founders of ‘PBL’ to the same extent as McMaster and Maastricht. To do this, the origins of the Aalborg model were traced back to their birthplace in Roskilde University in 1972 and placed in the context of the student movement of 1968, the ‘*Fagkritik*’ critical pedagogy neo-Marxist movement of the 1960s and 70s, and the work of the Denmark Institute of Educational Research. After a careful study of the literature on the subject of project work and PBL, the premises and practices of the Danish model of problem-oriented education in both its Roskilde and Aalborg iterations were then compared against the McMaster and Maastricht models of PBL. In a final instance, the thesis proposed a historic-philosophical analysis ‘self-directed learning’ as a central theme of PBL both historically and for future practice.

This summary will first provide an overview of the major findings of this thesis, chapter by chapter, then will provide some personal reflections from the PhD candidate on the research process, and close off with some suggestions for future research.

Overview of Major Findings

Part 1 – Of Woodstock and Disgruntled Medics

The first chapter proposed an overview of the historical development of PBL at McMaster University. The first important finding was that *contra* what is often cited in the literature, Howard Barrows was not directly involved in the inception of PBL, and did not join McMaster as a member of staff until after the start of the first class of McMaster. Instead, this thesis showed that the first person to sketch out the ideas for PBL was John Evans, founding Dean of McMaster School of Medicine; his right-hand man Bill Spaulding developed them into a workable curriculum; and Jim Anderson contributed most significantly to the pedagogical principles of PBL in its early years. However, this thesis did credit Barrows with two significant contributions: firstly, formalizing the appellation ‘problem-based learning’ in 1974 together with Vic Neufeld; secondly, a method of using simulated or programmed patients as problem-triggers for PBL. A second important finding of this chapter was that whilst the PBL tutorial was the most important educational tool used at McMaster, it was not the only one. The curriculum offered an array of eight different educational methods for instructors and students to choose from, including lectures (although their numbers were limited) and fieldwork. There were, however, no formal medical skills training classes until the 1980s. A third finding was that the McMaster curriculum was structured into four phases (the last of which was a clinical clerkship), in turn subdivided into interdisciplinary organ-systems based units such as

‘cardiovascular’ and ‘gastrointestinal’. Within these units, the tutorial was an unstructured affair held in very small groups of four or five students. The nature of the problems used in these tutorials varied greatly depending on the unit coordinator, and it seems that students did not have to follow a set order in which to tackle the problems. Finally, one element that was found across the board of McMaster units was the lack of formal assessment, as exams were believed to interfere with the principles of PBL. The key takeaway from this chapter is that the ‘founding fathers’ of McMaster did not come to McMaster with a steadfast plan, but made PBL up as they went along. The principles of problem-based learning crystallised through practice between 1966 and 1972, and whilst most of the original ideas stuck, others, such as community outreach, were dropped.

The second chapter provided a historical analysis of the theories that featured in the background to the development of PBL at McMaster. Only theories that could be expressly related to the founders either through explicit statements or through the use of jargon were considered. The first important finding of this chapter was that Evans and the founding fathers were probably inspired to some extent by the humanist psychology movement led by Carl Rogers at the University of Chicago in the 1940s and 50s. This affinity prompted Evans to phrase his proposal for the objectives of the Faculty of Medicine in terms of ‘self-directed learning’. Although hardly any explicit references to Rogers were to be found in the archival materials until the end of the 1970s, most of the founders referred to typical Rogerian concepts such as ‘T-groups’ and ‘self-education’. Despite this, the chapter showed that the founders were occasionally confused and self-contradictory in their understanding of the implications of a Rogerian education framework. Their attempts to tack behaviourist assessment methods and learning objectives onto their self-directed learning programme evidences our claim that they had no real understanding of education theory. Secondly, this thesis proposed that the famous Flexner Report on medical education in North America of 1910 contained important pedagogical recommendations that were taken to heart by the founders of McMaster. For instance, Flexner took aim at the obsolescence of lectures and highlighted the importance of providing practical laboratory experience in the first years of medical training. He was important enough in the thinking of the founders of PBL that extracts from the Flexner Report were quoted in Education Committee meetings in the late 1960s and Evans explicitly cited him as an influence on his thinking. Thirdly, the thesis showed the impact on PBL of Bill Spaulding’s particular affectation for the 16th century humanist scholar Johannes Comenius. By comparing the educational principles of the ‘Great Didactic’ with the McMaster curriculum, our analysis revealed that Comenius already saw the importance of limiting direct instruction and leaving time for students to study according to their own interest and direction. The chapter then debunked the claim so readily made in the literature that John Dewey was a primary source of inspiration for PBL. Referring to the works of Dewey between 1916 and 1933, this chapter showed that whilst Dewey developed many ideas that could be made to fit with the principles of PBL, he was never explicitly cited as an influence by any of the founders, and some of them did not even know who he was. Having provided such a historic-philosophical analysis of the rather thin theoretical backdrop for McMaster’s curriculum, the chapter then demonstrated that educational practice in North America and the UK was a far greater source of inspiration for

the founders of PBL. The major finding of this analysis was the great role played by the Harvard Case Method as a forerunner to PBL. The chapter presented the two ‘versions’ of the Harvard Case Method at the medical school and the business school and analysed the similarities and differences with PBL. The second important finding was the provenance of the systems-based curriculum, which McMaster borrowed from Western Reserve University that had been using it since 1952. Finally, we proposed that the idea for the tutorial group might have been borrowed from the so-called ‘Oxbridge’ tutorial in England, as the Oxford and Cambridge model was cited extensively in Education Committee meetings. This part of the thesis closed with the key takeaway that whilst there were indeed plenty of interesting educational theories and practices floating around the time of the invention of PBL, the key to understanding how PBL developed lies in understanding the historical context of the end of the 1960s (hence the reference to Woodstock), and the specific situation of the founding fathers who were essentially, as the title indicates, medics disgruntled with their own medical education.

Part 2 – A Case of You Lead – I Follow?

Chapter 3 looked at the development of PBL after it was brought from McMaster to Maastricht Faculty of Medicine in 1974 thanks to the friendship of John Evans with Maastricht’s founding Dean Harmen Tiddens. The most important finding of this chapter is that far from being a copy of the McMaster curriculum, the Maastricht medical education programme made significant changes to the way PBL was being done that justify calling it revolutionary in its own right. The first major change was to the structure of the curriculum, since McMaster had a three-year programme whereas Maastricht’s was six years. This meant that the three-phase structure of McMaster could not simply be carried over to Maastricht; all of the units had to be changed and the problems rewritten. As part of this process, Maastricht dropped the organ-systems as an organizing principle and instead focused on phases of human life and disease symptoms. The second major change was to the education process itself: the PBL tutorial was structured into a seven-step method, tutors and students began to receive training in PBL, and the ideal of the ‘non-expert tutor’ was institutionalised. Although many of these changes were initiated by the head of the Department of Educational Research and Development Wynand Wijnen, they were actually designed and implemented by his team of education researchers Henk Schmidt and Peter Bouhuijs. As the chapter duly describes, Wijnen was far more concerned with the development and implementation of the ‘*screeningtoets*’ which later became known as ‘Progress Test’, a new method of assessing medical knowledge without undermining the principles of PBL. Another major finding of this chapter is that the so-called ‘*Skillslab*’, the systematic instruction of medical skills in a laboratory setting using mannequins and instruments, was a Maastricht invention, later co-opted into the McMaster curriculum by Vic Neufeld, Howard Barrows and colleagues. Finally, this chapter found that Maastricht was the first institutions to pay serious attention to scientific research on PBL, with the first studies done on the subject in 1977 by Henk Schmidt and Peter Bouhuijs. The key takeaway from this chapter is not only that Maastricht created its own iteration of McMaster’s PBL, but that many of the practices developed at Maastricht, such as the Progress Test and the Skillslab, ended up being introduced at McMaster some years later. Given the popularity of inventions like the two

above-mentioned beyond the confines of PBL-practicing institutions, and the reach of the scientific literature that came out of Maastricht's research programme on PBL, it would be fair to say that Maastricht has contributed to changing medical education at least as much as McMaster.

Chapter 4 proposed an in depth account of the intellectual debate on the rationale and underlying principles of PBL that crystallised in Maastricht between 1972 and 1979, opposing Howard Barrows and Henk Schmidt. The first finding of this chapter was that unlike McMaster, which had an eclectic collection of inspirations from theory and practice, the Maastricht founders were not particularly concerned with education philosophy or educational best practice beyond the practice of PBL at McMaster. But under the aegis of the research programme on PBL at the Faculty of Medicine around 1977, Henk Schmidt began looking into cognitive psychology as an explanation for the success of PBL as a learning method. Cognitive psychology was at the time divided into two camps: on the one hand, the 'information-processing' interpretation led by Newell and Simon which likened the human reasoning and problem-solving process to the algorithm of a computer, and on the other hand, the 'constructivist' approach derived from the earlier work of Piaget and Vygotsky on the mental construction of knowledge, which had been synthesized by Jerome Bruner and colleagues in the late 1950s and 60s. The 'information-processing' paradigm was picked up and used in medical education research by Lee Shulman and Arthur Elstein, and then applied to PBL by Howard Barrows. The 'constructivist' position was most clearly voiced by Richard Anderson and colleagues in the 70s, and applied to PBL by Henk Schmidt. This resulted in a situation where Barrows explained PBL as a method for training 'hypothetico-deduction' and 'clinical reasoning skills' whereas Schmidt saw it as a method for 'activating prior knowledge', 'contextualising and structuring knowledge' and allowing students to elaborate on just-acquired knowledge to anchor it in long-term memory. In brief: Barrows thought the focus of PBL should be on primarily on learning a process, Schmidt thought that it should be primarily on the acquisition and understanding of content. This chapter retraced the evolution of Schmidt's thinking on the subject, from the early 70s when he still deferred to Barrows' theory, to the 1980s when the two were in open confrontation about their opposing view points. The chapter concludes with the finding that even though 'information-processing' was discredited as a model for understanding problem-solving in the 1980s, PBL practice continues to be split along the lines that opposed Schmidt and Barrows.

Part 3 – In search of the 'Heart' of PBL

The purpose of chapter 5 was to address Aalborg University's claim that its problem-oriented project-based educational model developed in the early 1970s could be labelled 'PBL', therefore effectively giving Aalborg a pioneering role in the history of PBL. It is well known that Aalborg modelled its education on the practices that had been developed at Roskilde University two years prior, so this chapter focused on presenting the premises of the Roskilde model, uncovering the extent to which the institutions historically diverged in terms of their pedagogical practices and how this could explain Aalborg's *post-hoc* claim that it was doing

‘PBL’ all along. The first key finding of this chapter is that the Danish project-work model is historically very distinct from the McMaster and Maastricht PBL models. The major difference is the underlying influence of student movements, social revolutionary ambitions and Frankfurt School ideas in the Danish model – although our findings show that these ideals were very prominent in Roskilde, but their influence rapidly diminished in Aalborg. Instead, Aalborg began relying more on Piagetian constructivist psychological accounts of project work proposed by the Danish education theorist Knud Illeris. To the extent that both of the Danish institutions, McMaster and Maastricht were borrowing ideas from progressive pedagogy and constructivist psychology, we found that project work could claim some common philosophical ancestry with PBL, but concluded that this provided a poor demarcation factor given that almost all progressive educational models share these roots. A third finding is that despite some similarity in the conception of teacher roles and group work, the models were organisationally very different: project work required extensive use of lectures whereas PBL minimised them, students formulated the problem in project work whilst teachers did so in PBL, problems in project work were long, complex and bound with social reality whilst problems in PBL were short and more structured. Attempting to explain why, despite these differences, Aalborg chose to call its model ‘PBL’, the chapter showed that as Roskilde was struggling with political conflicts in the 1970s, Aalborg took off as a centre for excellence in engineering education. We provided evidence to suggest that one of the reasons for adopting the term ‘PBL’ in the 1990s was as a means for Aalborg to distance itself from Roskilde and tap into the internationally recognised educational label of ‘PBL’ to promote its successful model of engineering education globally. The chapter concluded on an analysis of the present situation in which the very definition of ‘PBL’ has been blurred by the competing claims of Aalborg in favour of the assimilation of PBL and project work on the one hand, and of Roskilde and Maastricht for the separation of the two on the other. We suggested that the situation is presently deadlocked, as the participants are not competing on the same playing field: Maastricht pleads its case in the scientific literature, whereas Aalborg pleads its case in the development of practice in a growing number of countries. The key finding here is that the outcome of the debate over whether project-work should be labelled ‘PBL’ will likely change the very definition of PBL.

Chapter 6 closed off this thesis on a more philosophical reflection on the role of ‘self-directed learning’ in PBL. We reiterated the findings from chapter 2 on the origins of self-directed learning as a concept emerging from Rogerian humanist psychology in the 1950s, and showed how it was enmeshed with the pedagogical principles at McMaster. The chapter then proceeded to deconstruct the underlying philosophical assumptions of Rogers’ self-directed learning around the central themes of the Self, knowledge and our relation to the World. Having shown that Rogers’ entire philosophy revolved around the concept of an idiosyncratic Self whose experiences are incommensurable with those of others, we were able to reveal the individualistic premises of Rogerian self-directed learning. As a critique to this view on education, we proposed instead two theories of a socially-constructed Self, the first being Freire’s Dialogical Theory of Action and the second Vygotsky’s Cultural History paradigm. Whilst in Rogers’ theory the Self precedes all social interaction, the inverse is true of Freire and Vygotsky’s theories. Whereas Rogers did not see a requirement for teachers in education,

in Freire's theory teachers act as dialogical sparring partners and in Vygotsky's as knowledgeable others helping students make sense of their world. These differences, we showed, have important consequences for the education of democratic citizens, since the Rogierian concept of the Self does not allow for collective agency whereas Freire and Vygotsky would envisage the possibility meaningful social transformation through the tearing down and rebuilding of institutions to fit the collective needs of the present and future. As such, we argued, maintaining a Rogierian conception of self-directed learning in PBL is bound to make it just another instrument of the reigning neoliberal World-order. We concluded this chapter on some suggestions for enacting a version of PBL closer to Freire and Vygotsky's view of the role of education in personal and social transformation (the two being intimately linked), namely rethinking the role of tutors, and designing problems that can be analysed beyond their mere knowledge content.

Personal reflections

When the research for this treatise began, we were looking for simple, straightforward answers to historical questions about problem-based learning, assuming that they were to be found mostly in published literature, perhaps with the support of some oral history. In early 2012, Schmidt had just published a compilation of his ideas on history of PBL in a short chapter in a Singaporean book.⁹²⁹ As a major actor in that history, Schmidt knew enough about the background to PBL to point me away from common misconceptions in the field. Having met the Founding Fathers in person, he knew for instance about the key role played by Evans and his education committee while most were convinced that it was Barrows that had 'invented' PBL. What we did not know at the time was that hidden in the carefully kept archives of McMaster lay a goldmine of historical data, untouched for 40 years, that would seriously challenge what we thought we knew about the history of PBL. I headed to McMaster very early on in the project, given that the project hinged on ascertaining that there was indeed a story to tell. Extracts from a letter written to Schmidt during my stay at McMaster demonstrate the extent to which the visit to Hamilton spun the project in a new direction:

I thought I knew what PBL at 'Mac' was all about, I'd read the Barrows book, the Spaulding book, and even the Jack Haas story, and I assumed I was going to just go in there and either find all the confirming evidence for nicely cut out theories or evidence to support the opposite theory. I was not prepared at all to find that the evidence didn't support any theory that I had contemplated. All I found was one big mess. [...] Dealing with the prospect that there may not be one 'truth', but that the 'real' history of PBL may look more like a kaleidoscope, that's a difficult thing to do. However, this research has turned into a phenomenally exciting project. What I have found here challenges everything that I knew about the origins of PBL, and it has certainly shaken what people here at McMaster knew. [...] This crazy idea that was born out of the most chaotic planning effort I've ever come across somehow became the new religion of a group of educators who spread it across the world. It sounds like madness.⁹³⁰

From there on it was obvious that nobody's account could be trusted to be objective. I had to proceed with a process of ruthless triangulation, as described in the methods chapter of this treatise, untangling one historical question at a time, pitting archives against oral history and

⁹²⁹ Schmidt, Henk G, 'A brief history of problem-based learning'. In: *One-day, one-problem, an approach to problem-based learning*, ed. Glen O'Grady et al. (Singapore: Springer, 2012), 21-40.

⁹³⁰ Virginie Servant, personal communication with Henk Schmidt, 31st October 2012.

contemporary publications to induce what happened and stitch together the historical fragments into a coherent narrative. That narrative has been laid out in great detail throughout this treatise, giving first a historical overview of the chief characteristics of both the McMaster and the Maastricht curriculum in chapters 1 and 3, comparing them with one another to show that Maastricht quickly became a PBL model in its own right rather than a copy of McMaster, and then providing an in-depth theoretical discussion of the major philosophical and intellectual debates that dominated the development of PBL throughout the 1970s and early 1980s in chapters 2 and 4.

For a long time, we hesitated to include the story of Denmark in this book. On the one hand, Schmidt argued that if Denmark was included, then all forms of progressive education should also feature and this was neither feasible nor relevant. On the other hand, I pointed to the fact that international practice seems to strongly associate Aalborg's model with the term 'PBL', spreading confusion for educators around the World, and this issue should be clarified through a rigorous historical and philosophical analysis. In the end, my argument prevailed and we included the Danish story in Chapter 5, but the fact that so-doing meant winning over an opposing party meant the analysis had to be rock-solid, a result that took several attempts to achieve in the second half of the chapter.

We could just have left the debate there, closing off with the rise of PBL hybrids and various other iterations of PBL, but felt this to be an unsatisfactory ending to such a comprehensive historical piece of work. Something had to be said about the future, and as a PBL educator and scholar, I felt compelled to switch from a historical perspective to a philosophical and normative one, which took shape in chapter 6. I presented an early version of chapter 6 at the Philosophy of Education Society of Great Britain Dutch / Flemish Branch 50th anniversary conference in November 2015 in Rotterdam, and received much criticism for not articulating the critique to Rogers strongly enough. This was duly corrected in the final version of the chapter, which involved a thorough re-reading of Freire and Vygotsky. In the final instance, I was also forced to clarify my own position, no longer as a historian but as an education philosopher, to get off the proverbial fence and commit fully to a critical perspective on education, as unpopular as that stance may be in the present education context.

To close off this treatise, I will propose a summary of all major findings in this thesis, chapter by chapter, and some reflections for future research.

Impact on practice, limitations and future research

This thesis hopefully marks only the starting point of a renewed debate on the history and philosophy of PBL; one that is anchored in thorough historical research rather than secondary literature. This debate should not stay merely at an academic level, in the scientific literature, but also permeate through to practice in helping educators to understand the historical development of the principles underlying PBL. This research will be particularly useful in clarifying the differences between the various 'types' of PBL, such as the models proposed by Barrows *versus* the model proposed by Schmidt. It may also bring to light the issues and stakes in the discussion over the use of PBL terminology in project work. In both cases, it should help educators to make a more conscious choice about the type of PBL they are implementing, as

opposed to the haphazard implementations which are so commonplace today in higher education.

This research was limited by several factors beyond the author's control: the language barrier with Danish materials in particular, and the inaccessibility of certain manuscripts and other historical materials that are held by families of deceased pioneers of PBL but have not been circulated publicly yet. The language restrictions can easily be remedied by having this work revisited and critiqued by Danish historians, the availability of materials may resolve itself in the future if they find their way into the public domain, thus opening up opportunities for further historical research.

Given the wealth of unexplored information still held in the archives of McMaster and Maastricht, it can be hoped that they will be revisited by historians interested in other aspects of the history of PBL. After all, there are still many subjects left untouched by this thesis, such as the successes and failures of community-oriented education (perhaps in some of the Network's schools in the Africa and Asia), the history of PBL in fields other than medicine, and the development of PBL in K-12 education.

Samenvatting van de bevindingen

Probleemgestuurd onderwijs (PGO) is waarschijnlijk een van de succesvolste onderwijskundige uitvindingen van de twintigste eeuw. In tegenstelling tot veel andere onderwijskundige experimenten van na de Tweede Wereldoorlog is PGO dermate aangeslagen dat meer dan 500 instellingen voor hoger onderwijs, in bijna alle studierichtingen, beweren dat ze PGO in een of andere vorm toepassen. De interesse in wetenschappelijk onderzoek naar PGO is zo groot dat de zoekopdracht 'problem-based learning' in Google Scholar 360.000 resultaten oplevert. Het uitgangspunt van PGO is dat het leren van studenten begint in de confrontatie met een realistisch probleem dat ze in een kleine groep oplossen onder leiding van een tutor. Gezien het belang van zelfstudie in PGO is het aantal colleges noodzakelijkerwijs beperkt om studenten de gelegenheid te bieden relevante literatuur en theorieën op een zelfgestuurde wijze tot zich te nemen.

De geschiedenis van de methode is in de wetenschappelijke literatuur zo ongestructureerd behandeld dat het meeste van wat er is geschreven over de oorsprong en ontwikkeling, is gebaseerd op secundaire bronnen en analoge redeneringen zonder empirische toetsing. Dit proefschrift draagt bij tot dit onderzoeksgebied door de eerste systematische beschrijving van de intellectuele geschiedenis van PGO te bieden. Hiervoor zijn de archiefmaterialen, mondelinge geschiedenis en publicaties uit de begintijd van de eerste PGO-faculteiten getrianguleerd met behulp van de inductieve historische analysemethode van Whewell. In de periode die door dit proefschrift wordt bestreken, staan de beginjaren centraal van de eerste twee universiteiten waar PGO werd toegepast en waarin de meeste principes werden ontwikkeld, namelijk de McMaster University School of Medicine, van 1963 tot 1972, en de

faculteit Geneeskunde van de Universiteit Maastricht, van 1974 tot 1980. In het proefschrift wordt eerst een historisch beeld geschetst van de introductie en ontwikkeling van de PGO-curricula op beide faculteiten. Na het beschrijven van de grondleggers en hun bijdragen aan PGO hebben we het curriculum en de bijzonderheden van de PGO-tutorials op de beide faculteiten geschetst, zoals tutorselectie en -training, lengte en probleemttypen, tutorialstructuur, curriculumopbouw in interdisciplinaire onderdelen of in 'blokken', toetsing, training van medische vaardigheden en andere relevante aspecten. Na deze historische analyse wordt in het proefschrift een samenhangende en uitgebreide beschrijving gegeven van de theoretische proposities en de invloeden vanuit de onderwijspraktijk die de achtergrond vormden waartegen PGO werd ontwikkeld. Elke filosofische of psychologische theorie die in dit proefschrift naar voren wordt gebracht, is gekoppeld aan discussies die op McMaster of Maastricht werden gevoerd en die zijn vastgelegd in notulen van vergaderingen, memo's en ander archiefmateriaal. Voor elke theorie wordt in het proefschrift nagegaan in hoeverre deze van historisch belang was voor de ontwikkeling van PGO, ofwel in welke mate medewerkers van McMaster of Maastricht expliciet beweerden dat ze hun ideeën hieraan ontleenden of in welke mate het jargon van de theorie is terug te vinden in de taal die door de grondleggers werd gebruikt. Vervolgens worden de centrale stellingen van de theorieën blootgelegd onder verwijzing naar de oorspronkelijke teksten van de desbetreffende auteurs om duidelijk te maken hoe deze stellingen samenhangen met de principes van PGO. Hiertoe zijn de originele teksten vergeleken met de historische praktijk van PGO in de onderzochte instellingen. Wanneer we stuiten op intellectuele geschillen, zoals de strijd tussen humanistische en behavioristische toetsingsprincipes op McMaster en de discussie over het focussen op het redeneringsproces of op de inhoud bij problemen op Maastricht, worden de theorieën die ten grondslag liggen aan beide standpunten uiteengezet en in hun historische context geplaatst. Bovendien wordt de ontwikkeling van de discussie door de jaren heen beschreven en wordt uiteengezet wat de gevolgen hiervan waren voor de ontwikkeling van PGO.

Hoewel dit voldoende zou zijn geweest voor een uitgebreide beschrijving van de oorsprong van PGO, wordt in dit proefschrift een stap verder gegaan en komen twee vraagstukken aan de orde die centraal staan in de huidige stand van PGO. Ten eerste bevat de verhandeling een historische, filosofische en organisatorische analyse van de bewering van de universiteit van Aalborg vanaf de jaren 90, dat haar projectwerkmodel een versie is van PGO. Aangezien dit model dateert uit 1974, zou dit betekenen dat Aalborg net als McMaster en Maastricht tot de grondleggers van 'PGO' behoort. Om dit te onderzoeken hebben we de herkomst van het Aalborg-model teruggelid tot de bakermat op de universiteit van Roskilde in 1972 en het model binnen de context geplaatst van de studentenbeweging van 1968, de kritische neomarxistische pedagogiebeweging '*Fagkritik*' van de jaren 60 en 70 en het werk van het Deense instituut voor onderwijskundig onderzoek. Na grondige studie van de literatuur over projectwerk en PGO zijn vervolgens de vooronderstellingen en praktijken van het Deense model van probleemgericht onderwijs in de varianten van Roskilde en Aalborg vergeleken met de PGO-modellen van McMaster en Maastricht. Ten slotte biedt het proefschrift een historisch-filosofische analyse van 'zelfgestuurd leren' als centraal thema van PGO in de historische en de toekomstige praktijk.

Deze samenvatting biedt eerst een overzicht van de belangrijkste bevindingen van dit proefschrift per hoofdstuk. Vervolgens volgt een aantal persoonlijke reflecties van de promovendus op het onderzoeksproces, waarna een aantal suggesties wordt gedaan voor toekomstig onderzoek.

Overzicht van de belangrijkste bevindingen

Deel 1 – Over Woodstock en ontevreden medici

Het eerste hoofdstuk biedt een overzicht van de historische ontwikkeling van PGO op de McMaster University. De eerste belangrijke bevinding is dat, in tegenstelling tot wat vaak wordt vermeld in de literatuur, Howard Barrows niet rechtstreeks was betrokken bij het begin van PGO en pas werd aangenomen op McMaster toen daar de eerste les al was gegeven. De eerste persoon die de ideeën voor PGO schetste, zo blijkt uit dit proefschrift, was niet Howard Barrows maar John Evans, bouwdecaan van de McMaster School of Medicine; zijn rechterhand Bill Spaulding werkte deze ideeën uit tot een uitvoerbaar curriculum; en Jim Anderson was grotendeels verantwoordelijk voor de pedagogische principes van PGO in de beginjaren. Wel worden in dit proefschrift twee belangrijke bijdragen aan Barrows toegeschreven: ten eerste het formaliseren van de benaming ‘problem-based learning’ in 1974 samen met Vic Neufeld; ten tweede de methode om gesimuleerde of geprogrammeerde patiënten te gebruiken als probleemtriggers voor PGO. Een tweede belangrijke bevinding in dit hoofdstuk is dat de PGO-tutorial weliswaar het belangrijkste onderwijsinstrument was op McMaster, maar dat dit niet het enige was. Het curriculum bood acht verschillende onderwijsmethoden waaruit instructeurs en studenten konden kiezen, waaronder colleges (hoewel beperkt in aantal) en veldwerk. De formele trainingen van medische vaardigheden begonnen echter pas in de jaren 80. Een derde bevinding is dat het curriculum van McMaster was gestructureerd in vier fasen (waarvan het klinische coschap de laatste was), die op hun beurt weer waren opgedeeld in interdisciplinaire onderdelen op basis van orgaansystemen, zoals ‘cardiovasculair’ en ‘gastro-intestinaal’. Binnen deze onderdelen was de tutorial een ongestructureerde aangelegenheid die in zeer kleine groepen van vier tot vijf studenten plaatsvond. De aard van de problemen die in deze tutorials aan de orde kwamen, liep sterk uiteen, afhankelijk van de coördinator van het onderdeel, en studenten hoefden de problemen blijkbaar niet in een vaste volgorde op te lossen. Ten slotte was één element dat alle onderdelen van McMaster gemeen bleken te hebben, de afwezigheid van een formele toetsing omdat men meende dat examens indruisten tegen de principes van PGO. De belangrijkste conclusie van dit hoofdstuk is dat de grondleggers van McMaster niet naar McMaster kwamen met een vastomlijnd plan, maar PGO gaandeweg ontwikkelden. De principes van problem-based learning kristalliseerde zich tussen 1966 en 1972 uit in de praktijk en hoewel de meeste van de oorspronkelijke ideeën beklijfden, werden andere, zoals teamwork, overboord gezet.

Het tweede hoofdstuk bevat een historische analyse van de theorieën die op de achtergrond een rol speelden in de ontwikkeling van PGO op McMaster. Hierin zijn alleen theorieën meegenomen die expliciet aan de grondleggers konden worden gerelateerd door middel van

uitdrukkelijke verklaringen of het gebruik van jargon. De eerste belangrijke bevinding in dit hoofdstuk is dat Evans en de grondleggers waarschijnlijk deels werden geïnspireerd door de humanistische psychologiebeweging die werd geleid door Carl Rogers van de University of Chicago in de jaren 40 en 50. Deze affiniteit bracht Evans ertoe zijn voorstel voor de doelstellingen van de medische faculteit te formuleren in termen van ‘zelfgestuurd leren’. Hoewel er in het archiefmateriaal tot het einde van de jaren 70 nauwelijks expliciet naar Rogers wordt verwezen, gebruikten de meeste grondleggers typisch rogeriaanse concepten zoals ‘t-groepen’ en ‘zelfeducatie’. Desondanks blijkt uit het hoofdstuk dat de grondleggers soms in de war waren en zichzelf tegenspraken waar het hun begrip van de implicaties van een rogeriaans onderwijskader betrof. Hun pogingen om behavioristische toetsingsmethoden en leerdoelstellingen toe te voegen aan hun zelfgestuurde leerprogramma, staven onze stelling dat ze onderwijstheorieën niet werkelijk begrepen. Ten tweede wordt in dit proefschrift gesteld dat het beroemde Flexner-rapport over medisch onderwijs in Noord-Amerika uit 1910 belangrijke pedagogische aanbevelingen bevatte die door de grondleggers van McMaster ter harte werden genomen. Flexner vond colleges bijvoorbeeld een verouderde onderwijsvorm en benadrukte het belang van praktische laboratoriumervaring in de eerste jaren van de medische opleiding. Hij speelde een dermate belangrijke rol in het denken van de grondleggers van PGO dat fragmenten uit het Flexner-rapport werden geciteerd tijdens vergaderingen van de onderwijscommissie eind jaren 60 en dat Evans hem expliciet noemde als iemand die zijn denken had beïnvloed. Ten derde laat het proefschrift zien hoe PGO werd beïnvloed doordat Bill Spaulding zich aangetrokken voelde tot de ideeën van de zestiende-eeuwse humanistische geleerde Johannes Comenius. Uit onze analyse van een vergelijking tussen de onderwijsprincipes van de ‘grote didacticus’ en het curriculum van McMaster blijkt dat Comenius het belang inzag van minder directe instructie en meer tijd voor studenten om zelfgestuurd vanuit hun eigen interesses te studeren. In het hoofdstuk wordt vervolgens de bewering ontkracht dat John Dewey de primaire inspiratiebron was voor PGO. Deze bewering wordt in de literatuur veelvuldig gedaan. Op basis van de werken van Dewey tussen 1916 en 1933 laat dit hoofdstuk zien dat Dewey weliswaar veel ideeën heeft ontwikkeld die passen binnen de principes van PGO, maar dat hij door de grondleggers nooit expliciet als invloed is genoemd en dat sommige van hen hem niet eens kenden. Na deze historisch-filosofische analyse van de vrij magere theoretische achtergrond voor het curriculum van McMaster wordt in dit hoofdstuk aangetoond dat de onderwijspraktijk in Noord-Amerika en het Verenigd Koninkrijk een veel grotere inspiratiebron vormde voor de grondleggers van PGO. De belangrijkste bevinding van deze analyse is de grote rol die de Harvard Case Method speelde als voorloper van PGO. In het hoofdstuk worden de twee ‘versies’ van de Harvard Case Method op de medische en de bedrijfskundige faculteit uiteengezet en worden de overeenkomsten en verschillen met PGO geanalyseerd. De tweede belangrijke bevinding is de herkomst van het systeemgebonden curriculum, dat op McMaster werd overgenomen van de Western Reserve University waar dit vanaf 1952 werd toegepast. Ten slotte stellen we dat het idee voor de tutorialgroep mogelijk is ontleend aan de zogenoemde ‘Oxbridge’-tutorial in Engeland, aangezien het Oxford- en Cambridge-model tijdens vergaderingen van de onderwijscommissie veelvuldig werd genoemd. Dit deel van het proefschrift eindigt met de belangrijkste conclusie, namelijk dat er ten tijde van de uitvinding van PGO inderdaad tal van interessante onderwijstheorieën en -praktijken werden gehanteerd, maar dat de sleutel tot het begrijpen van

de ontwikkeling van PGO ligt in het begrijpen van de historische context van eind jaren 60 (vandaar de verwijzing naar Woodstock) en de specifieke situatie van de grondleggers die, zoals de titel aangeeft, hoofdzakelijk medici waren die ontevreden waren over hun eigen medische opleiding.

Deel 2 – Een geval van ‘U leidt, ik volg’?

In hoofdstuk 3 wordt gekeken naar de ontwikkeling van PGO nadat het in 1974 vanuit McMaster de faculteit Geneeskunde van Maastricht werd binnengebracht door de vriendschap tussen John Evans en Harmen Tiddens, bouwdecaan van Maastricht. De belangrijkste bevinding in dit hoofdstuk is dat het medische onderwijsprogramma van Maastricht absoluut geen kopie was van het curriculum van McMaster. De uitvoering van PGO was dermate gewijzigd, dat met recht kan worden gesproken van een revolutionaire, opzichzelfstaande methode. De eerste belangrijke wijziging werd doorgevoerd in de structuur van het curriculum: het programma van McMaster duurde drie jaar, dat van Maastricht zes. Hierdoor kon de driefasenstructuur van McMaster niet zonder meer worden overgenomen door Maastricht; alle onderdelen moesten worden gewijzigd en de problemen herschreven. In het kader van dit proces verliet Maastricht de orgaansystemen als organiserend principe en concentreerde zich in plaats hiervan op de menselijke levensfasen en de ziekteverschijnselen. De tweede belangrijke wijziging werd aangebracht in het onderwijsproces zelf: de PGO-tutorial werd gestructureerd volgens de zevenstappenmethode, tutors en studenten kregen training in PGO en het ideaal van de ‘niet-deskundige tutor’ werd geïnstitutionaliseerd. Hoewel veel van deze wijzigingen werden geïnitieerd door Wynand Wijnen, hoofd van de vakgroep Onderwijsontwikkeling en -onderzoek, werden ze daadwerkelijk bedacht en ingevoerd door zijn team van onderwijsonderzoekers, bestaande uit Henk Schmidt en Peter Bouhuijs. Zoals in het hoofdstuk is beschreven, hield Wijnen zich veel meer bezig met de ontwikkeling en invoering van de ‘*screeningtoets*’ die later bekend werd onder de naam ‘voortgangstest’. Dit was een nieuwe methode om medische kennis te toetsen zonder afbreuk te doen aan de principes van PGO. Nog een belangrijke bevinding in dit hoofdstuk is dat het zogenoemde ‘*skillslab*’, de systematische instructie van medische vaardigheden in een laboratoriumsituatie met behulp van etalagepoppen en instrumenten, een Maastrichtse uitvinding was die later in het curriculum van McMaster werd opgenomen door Vic Neufeld, Howard Barrows en collega’s. Ten slotte blijkt uit dit hoofdstuk dat Maastricht de eerste instelling was waar serieus aandacht werd besteed aan wetenschappelijk onderzoek naar PGO. De eerste studies naar dit onderwerp werden in 1977 uitgevoerd door Henk Schmidt en Peter Bouhuijs. De belangrijkste conclusie in dit hoofdstuk is niet alleen dat Maastricht een eigen iteratie van McMasters PGO creëerde, maar dat veel van de praktijken die in Maastricht werden ontwikkeld, zoals de voortgangstest en het skillslab, enkele jaren later op McMaster werden geïntroduceerd. Gezien de populariteit van uitvindingen zoals de twee bovengenoemde op andere instellingen dan die waar PGO werd toegepast, en het bereik van de wetenschappelijke literatuur die voortkwam uit het Maastrichtse onderzoeksprogramma naar PGO, kan worden gesteld dat Maastricht minstens zoveel heeft bijgedragen aan de veranderingen in het medisch onderwijs als McMaster.

Hoofdstuk 4 bevat een uitvoerige beschrijving van het intellectuele debat over de logica en onderliggende principes van PGO die zich tussen 1972 en 1979 uitkristalliseerden in Maastricht, waarbij Howard Barrows en Henk Schmidt tegenover elkaar stonden. De eerste bevinding in dit hoofdstuk is dat de Maastrichtse grondleggers vooral waren geïnteresseerd in de PGO-praktijk op McMaster en niet zozeer in onderwijsfilosofie of beproefde onderwijspraktijken, dit in tegenstelling tot McMaster waar men een bonte verzameling inspiratiebronnen had uit de theorie en praktijk. Echter, in het kader van het onderzoeksprogramma naar PGO op de faculteit Geneeskunde begon Henk Schmidt rond 1977 een onderzoek naar de cognitieve psychologie als verklaring voor het succes van PGO als leermethode. De cognitieve psychologie was toentertijd verdeeld in twee kampen: enerzijds de ‘informatieverwerkende’ interpretatie van Newell en Simon die het menselijke redenerings- en probleemoplossingsproces vergeleek met het algoritme van een computer, en anderzijds de ‘constructivistische’ benadering die was ontleend aan het vroege werk van Piaget en Vygotsky over de mentale constructie van kennis en eind jaren 50 en 60 tot een geheel was gemaakt door Jerome Bruner en collega’s. Het ‘informatieverwerkende’ paradigma werd opgepikt en gebruikt in het onderzoek naar medisch onderwijs van Lee Shulman en Arthur Elstein, en vervolgens toegepast op PGO door Howard Barrows. Het ‘constructivistische’ standpunt werd het duidelijkst verwoord door Richard Anderson en collega’s in de jaren 70, en toegepast op PGO door Henk Schmidt. Dit leidde tot de situatie dat Barrows PGO uitlegde als een methode voor het trainen van de ‘hypothetisch-deductieve’ en ‘klinische redeneringsvaardigheden’, terwijl Schmidt PGO beschouwde als een methode om ‘voorkennis te activeren’, ‘kennis te contextualiseren en structureren’ en studenten in staat te stellen pas verworven kennis te versterken en in het langetermijngeheugen te verankeren. Kortom, Barrows vond dat de focus bij PGO moest liggen op het aanleren van een proces terwijl Schmidt vond dat het primair gericht moest zijn op het verwerven en begrijpen van inhoud. In dit hoofdstuk wordt de ontwikkeling van Schmidts inzichten over het onderwerp getraceerd vanaf het begin van de jaren 70 toen hij zich nog conformeerde aan de theorie van Barrows, tot de jaren 80 toen de twee openlijk tegenover elkaar stonden met hun verschillende visies. Het hoofdstuk wordt afgesloten met de bevinding dat, hoewel ‘informatieverwerking’ in de jaren 80 had afgedaan als verklaringsmodel voor probleemoplossing, er door de PGO-praktijk nog altijd een scheidslijn loopt die is gebaseerd op de tegengestelde opvattingen van Schmidt en Barrows.

Deel 3 – Op zoek naar het ‘hart’ van PGO

Het doel van hoofdstuk 5 was om de bewering van de universiteit van Aalborg te onderzoeken dat het probleemgerichte projectgebonden onderwijsmodel dat daar in het begin van de jaren 70 is ontwikkeld, kan worden bestempeld als ‘PGO’, wat zou betekenen dat Aalborg in feite een pioniersrol heeft vervuld in de historie van PGO. Het is bekend dat Aalborg haar onderwijs baseerde op de praktijken die twee jaar eerder waren ontwikkeld op de universiteit van Roskilde. Daarom worden in dit hoofdstuk de vooronderstellingen van het model van Roskilde uiteengezet om ontdekken in welke mate de pedagogische praktijken van de instellingen historisch verschilden en hoe dit de post-hocbewering van Aalborg kan verklaren dat deze altijd al ‘PGO’ toepaste. De eerste belangrijke bevinding in dit hoofdstuk is dat het Deense projectwerkmodel historisch gezien aanzienlijk verschilt van de PGO-modellen van McMaster en Maastricht. Het belangrijkste verschil is de onderliggende invloed van

studentenbewegingen, sociaal-revolutionaire aspiraties en ideeën van de Frankfurter Schule in het Deense model. Onze bevindingen laten zien dat deze idealen weliswaar een zeer prominente rol speelden in Roskilde, maar dat hun invloed in Aalborg snel afnam. In plaats hiervan begon Aalborg meer te leunen op de piagetiaanse constructivistische-psychologiestudies van projectwerk van de Deense onderwijstheoreticus Knud Illeris. Voor zover de beide Deense instellingen, McMaster en Maastricht ideeën ontleenden aan de progressieve pedagogie en constructivistische psychologie, stelden we vast dat projectwerk en PGO deels dezelfde filosofische afstamming hebben maar concludeerden we ook dat dit geen goede afbakeningsfactor is aangezien bijna alle progressieve onderwijsmodellen deze wortels gemeen hebben. Een derde bevinding is dat, ondanks enkele overeenkomsten in de opzet van docentrollen en groepswork, de modellen organisatorisch zeer verschillend waren: bij projectwerk werd uitgebreid gebruikgemaakt van colleges terwijl deze bij PGO tot het minimum waren beperkt; bij projectwerk formuleerden studenten het probleem terwijl dit bij PGO door docenten werd gedaan; de problemen bij projectwerk waren groot, complex en gerelateerd aan de sociale werkelijkheid terwijl die bij PGO klein en meer gestructureerd waren. In een poging te verklaren waarom Aalborg, ondanks deze verschillen, ervoor koos het model ‘PGO’ te noemen, blijkt uit dit hoofdstuk dat Aalborg in de jaren 70 populair werd als ‘centre of excellence’ voor technisch onderwijs terwijl Roskilde worstelde met politieke conflicten. We leveren bewijs dat een van de redenen waarom Aalborg in de jaren 90 de term ‘PGO’ ging gebruiken, was dat Aalborg zich hiermee kon distantiëren van Roskilde en kon profiteren van het internationaal erkende onderwijslabel ‘PGO’ om haar succesvolle model voor technisch onderwijs wereldwijd te promoten. Het hoofdstuk wordt afgesloten met een analyse van de huidige situatie waarin de definitie van ‘PGO’ onduidelijk is geworden door de concurrerende aanspraken van enerzijds Aalborg die PGO en projectwerk wil assimileren en anderzijds Roskilde en Maastricht die de twee gescheiden willen houden. We opperen dat de situatie momenteel in een impasse verkeert omdat de deelnemers niet op hetzelfde speelveld strijden. Maastricht bepleit haar zaak in de wetenschappelijke literatuur, terwijl Aalborg haar zaak bepleit door de ontwikkeling van de PGO-praktijk in een toenemend aantal landen. De belangrijkste bevinding is dat de uitkomst van de discussie over de vraag of projectwerk als ‘PGO’ moet worden bestempeld, waarschijnlijk zal leiden tot een andere definitie van PGO.

Hoofdstuk 6 is het laatste hoofdstuk van dit proefschrift en bevat een meer filosofische reflectie op de rol van ‘zelfgestuurd leren’ in PGO. We herhalen de bevindingen uit hoofdstuk 2 over de herkomst van zelfgestuurd leren als afgeleid concept uit de rogeriaanse humanistische psychologie in de jaren 50 en laten zien hoe het verweven raakte met de pedagogische principes op McMaster. Het hoofdstuk bevat vervolgens een deconstructie van de onderliggende filosofische aannamen van het rogeriaanse zelfgestuurd leren rondom de centrale thema’s van het Zelf, kennis en onze relatie met de wereld. Nadat we hadden aangetoond dat de volledige filosofie van Rogers draaide om het concept van een idiosyncratisch Zelf waarvan de ervaringen onvergelykbaar zijn met die van anderen, konden we de individualistische vooronderstellingen van het rogeriaanse zelfgestuurde leren blootleggen. Als kritiek op deze onderwijsvisie bieden we twee alternatieve theorieën van een sociaal geconstrueerde Zelf: de dialogische actietheorie van Freire en het cultuurhistorische paradigma van Vygotsky. Waar in

de theorie van Rogers het Zelf voorafgaat aan alle sociale interactie, geldt in de theorieën van Freire en Vygotsky het omgekeerde. Terwijl Rogers docenten niet nodig vond in het onderwijs, fungeren docenten in Freires theorie als dialogische sparringpartners en in Vygotsky's theorie als deskundige anderen die studenten helpen de wereld te begrijpen. We laten zien dat deze verschillen belangrijke gevolgen hebben voor het onderwijs van democratische burgers, aangezien het rogeriaanse concept van het Zelf geen collectief actorschap toestaat, terwijl Freire en Vygotsky wel voorzien in de mogelijkheid van betekenisvolle sociale transformatie door afbraak en heropbouw van instituties om tegemoet te komen aan de collectieve noden van het heden en de toekomst. Daarom leidt, zo betogen wij, het handhaven van een rogeriaanse opvatting van zelfgestuurd leren in PGO er onvermijdelijk toe dat PGO niet meer zal zijn dan het zoveelste instrument van de heersende neoliberale wereldorde. We sluiten dit hoofdstuk af met enkele suggesties voor het opstellen van een PGO-versie die dichter ligt bij de visie van Freire en Vygotsky op de rol die onderwijs speelt in de persoonlijke en sociale transformatie (die nauw verbonden zijn), namelijk het herzien van de rol van tutores en het bedenken van problemen die kunnen worden geanalyseerd buiten louter het kennisinhoudelijke.

Persoonlijke reflecties

Toen het onderzoek voor deze verhandeling begon, waren we op zoek naar eenvoudige duidelijke antwoorden op historische vragen over problem-based learning, waarbij we ervan uitgingen dat deze vooral te vinden waren in gepubliceerde literatuur, mogelijk ondersteund door enige mondelinge geschiedenis. Begin 2012 had Schmidt net een compilatie van zijn ideeën over de geschiedenis van PGO gepubliceerd in een kort hoofdstuk van een Singaporees boek.⁹³¹ Aangezien hij een van de hoofdpersonen was geweest in deze geschiedenis, wist Schmidt genoeg van de achtergrond van PGO om ervoor te zorgen dat ik veelvoorkomende misvattingen in dit onderzoeksgebied niet overnam. Aangezien hij de grondleggers persoonlijk had ontmoet, wist hij bijvoorbeeld van de sleutelrol die Evans en zijn onderwijscommissie hadden gespeeld terwijl de meesten ervan overtuigd waren dat het Barrows was die PGO had 'uitgevonden'. Wat we destijds niet wisten, was dat de zorgvuldig bijgehouden archieven van McMaster een goudmijn aan historische gegevens bevatten die 40 jaar onaangeroerd waren gebleven en waardoor alles wat we dachten te weten over de geschiedenis serieus ter discussie werd gesteld. Ik ging al vroeg in het project naar McMaster om te verifiëren of er inderdaad een verhaal viel te vertellen en ik het project kon uitvoeren. Fragmenten uit een brief die ik aan Schmidt schreef tijdens mijn verblijf op McMaster laten zien in welke mate het project in een nieuwe richting werd gestuurd door het bezoek aan Hamilton:

Ik dacht dat ik precies wist wat PGO op 'Mac' inhield: ik had het boek van Barrows, het boek van Spaulding en zelfs het verhaal van Jack Haas gelezen en ik ging ervan uit dat ik slechts naar binnen hoefde te lopen om alle bewijsmateriaal te vinden voor keurig op maat gesneden theorieën of voor de tegenovergestelde theorie. Ik was er helemaal niet op voorbereid dat het bewijs geen enkele theorie die ik in gedachten had, zou staven. Het enige wat ik aantrof, was één grote chaos. [...] Het vooruitzicht dat er niet één 'waarheid' zou zijn maar dat de 'werkelijke' geschiedenis van PGO meer weg had van een caleidoscoop, was moeilijk te accepteren. Dit onderzoek is echter een geweldig boeiend project geworden. Wat ik hier heb ontdekt, stelt alles wat ik wist over de oorsprong van PGO op losse schroeven en heeft dat wat de mensen hier op McMaster wisten, beslist aan het wankelen gebracht. [...] Dit idiote idee dat

⁹³¹ Schmidt, Henk G, 'A brief history of problem-based learning'. In: *One-day, one-problem, an approach to problem-based learning*, ed. Glen O'Grady et al. (Singapore: Springer, 2012), 21-40.

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voortkwam uit de meest chaotische planningsinspanning dat ik ooit ben tegengekomen, werd op een of andere manier de nieuwe religie van een groep docenten die het over de hele wereld verspreidden. Het klinkt krankzinnig. [Dit is een vertaling van de oorspronkelijke fragmenten.]⁹³²

Vanaf dat moment was het duidelijk dat ik er niet van uit kon gaan dat bronnen objectief waren. Zoals in deze verhandeling is beschreven in het hoofdstuk over methoden, moest ik een genadeloos triangulatieproces uitvoeren, waarbij ik historische vragen één voor één ontrafelde door archiefmateriaal te vergelijken met mondelinge geschiedenis en hedendaagse publicaties. Uit deze vergelijking kon ik afleiden wat er was gebeurd zodat ik de historische puzzelstukjes kon samenvoegen tot een coherent verhaal. Dit verhaal heb ik in deze verhandeling zeer gedetailleerd verteld waarbij ik eerst in hoofdstuk 1 en 3 een historisch overzicht van de belangrijkste kenmerken van de curricula van McMaster en Maastricht heb gegeven en deze heb vergeleken om te laten zien dat de Maastrichtse variant al snel een op zichzelf staand PGO-model werd en geen kopie was van McMaster. Vervolgens bevatten hoofdstuk 2 en 4 een uitvoerige theoretische discussie van de belangrijkste filosofische en intellectuele debatten die in de jaren 70 en begin jaren 80 de ontwikkeling van PGO domineerden.

We hebben lang getwijfeld of we het verhaal van Denemarken in dit boek zouden opnemen. Enerzijds betoogde Schmidt dat, als we Denemarken opnamen, ook alle andere vormen van progressief onderwijs aan de orde moesten worden gesteld, maar dit was niet haalbaar en ook niet relevant. Anderzijds wees ik op het feit dat het model van Aalborg in de internationale praktijk sterk wordt geassocieerd met de term ‘PGO’, wat tot verwarring leidt bij docenten over de hele wereld, en dat dit vraagstuk zou moeten worden opgehelderd door middel van een grondige historische en filosofische analyse. Uiteindelijk gaf mijn argument de doorslag en hebben we in hoofdstuk 5 het Deense verhaal opgenomen, maar het feit dat ik een andere partij moest overtuigen betekende wel dat de analyse uiterst gedegen moest zijn. Om dit resultaat te bereiken in de tweede helft van het hoofdstuk waren meerdere pogingen nodig.

We hadden de discussie hier kunnen beëindigen en kunnen afsluiten met de opkomst van de PGO-hybriden en diverse andere iteraties van PGO, maar dit vonden we een onbevredigend einde van een dergelijk uitgebreid historisch werkstuk. Er moest nog iets worden gezegd over de toekomst en als PGO-docent en -wetenschapper voelde ik me gedwongen om het historische perspectief in te wisselen voor een filosofisch en normatief perspectief, wat in hoofdstuk 6 is gebeurd. Tijdens de conferentie in het kader van het vijftigjarig bestaan van de Nederlands-Vlaamse afdeling van de Philosophy of Education Society of Great Britain in november 2015 in Rotterdam presenteerde ik een eerdere versie van hoofdstuk 6 en werd ik hevig bekritiseerd omdat ik de kritiek op Rogers niet sterk genoeg had geformuleerd. Dit is in de eindversie van het hoofdstuk gecorrigeerd, waarvoor een grondige herlezing van Freire en Vygotsky nodig was. In laatste instantie zag ik mij ook gedwongen helderheid te verschaffen over mijn eigen standpunt, niet als historicus maar als onderwijsfilosoof, en mij volledig te committeren aan een kritisch perspectief op onderwijs, hoe onpopulair dit standpunt ook mag zijn binnen de huidige onderwijscontext. Ter afsluiting van deze verhandeling geef ik per hoofdstuk een overzicht van alle belangrijke bevindingen in dit proefschrift en enige suggesties voor verder onderzoek.

⁹³² Virginia Servant, persoonlijke communicatie met Henk Schmidt, 31 oktober 2012.

Invloed op de praktijk, beperkingen en toekomstig onderzoek

Hopelijk vormt dit proefschrift slechts het vertrekpunt voor een hernieuwde discussie over de historie en filosofie van PGO: één die is gefundeerd op gedegen historisch onderzoek in plaats van op secundaire literatuur. Deze discussie moet niet alleen op academisch niveau in wetenschappelijke literatuur worden gevoerd, maar ook doordringen tot de praktijk om docenten inzicht te geven in de historische ontwikkeling van de onderliggende principes van PGO. Dit onderzoek zal vooral nuttig zijn om de verschillen duidelijk te maken tussen de diverse ‘typen’ PGO, zoals de modellen die zijn opgesteld door Barrows versus het model van Schmidt. Het kan ook aan het licht brengen welke vraagstukken en belangen een rol spelen in de discussie over het gebruik van PGO-terminologie in projectwerk. In beide gevallen kan het onderzoek ertoe bijdragen dat docenten bewuster voor een bepaald PGO-type kiezen in plaats van zomaar een type te implementeren zoals tegenwoordig vaak gebeurt in het hoger onderwijs.

Dit onderzoek werd beperkt door enkele factoren die buiten de macht van de auteur lagen; de taalbarrière met vooral de Deense materialen en de ontoegankelijkheid van een aantal manuscripten en andere historische materialen die eigendom zijn van familie van overleden PGO-pioniers, maar nog niet openbaar zijn gemaakt. De beperkingen van de taal kunnen eenvoudig worden weggenomen door dit werk te laten bijstellen en kritiseren door Deense historici. De niet-beschikbaarheid van materialen lost zich in de toekomst vanzelf op als deze hun weg vinden naar het publieke domein, wat verder historisch onderzoek mogelijk maakt.

Gezien de schat aan onverkende informatie die nog aanwezig is in de archieven van McMaster en Maastricht, valt te hopen dat deze opnieuw worden bezocht door historici die zijn geïnteresseerd in andere aspecten van de historie van PGO. Er zijn immers nog veel onderwerpen die in dit proefschrift onaangeroerd zijn gebleven, zoals de successen en mislukkingen van gemeenschapsgericht onderwijs (eventueel op een aantal netwerkfaculteiten in Afrika en Azië), de geschiedenis van PGO in andere onderzoeksgebieden dan de geneeskunde en de ontwikkeling van PGO in K-12-onderwijs.

Abbreviations

AUC: Aalborg University Centre

DIER: Danish Institute for Educational Research

DSF: *Danske studerendes fællesråd* (Danish Student Union)

EC: Education Committee

FOOF: Fine Old Ontario Family

GPS: General Problem Solver

HPS: Human Processing System

IPS: Information Processing System

LMCC: Licentiate of the Medical Council of Canada

MD: Medical Doctor

MFM: Maastricht Faculty of Medicine

RUC: Roskilde University Centre

About the author



Virginie Servant is a lecturer at Erasmus University College, in Rotterdam, where she teaches a wide array of Liberal Arts & Sciences courses using problem-based learning. She is also responsible for the PBL training programme of EUC within the University Teaching Qualification framework.

Virginie obtained a First Class Bachelor of Arts with Honours from the University of Kent in the United Kingdom in 2008, majoring in Politics, Philosophy and Economics. Her bachelor thesis dealt with the political history of the US-Latin American relationship. She obtained an LLM with Distinction from the Kent Law School in 2009, writing her Masters' thesis on the protection of indigenous people's rights in the Americas. In addition, she obtained a Masters degree from Sciences Po (Institut d'Etudes Politiques) Lille with "mention Bien" in 2009, completed simultaneously as her studies in the UK through the joint-degree programme between Sciences Po and the University of Kent.

During her studies, Virginie began interning and volunteering in various NGOs in the Caribbean, Sub-Saharan Africa and South-East Asia. In 2009, she left the NGO scene and worked as a personal and research assistant to an INSEAD professor in Fontainebleau (France) and Singapore on education research projects, and in 2011 moved to Singapore where she founded Promethea Education, an education research and consultancy organisation working in partnership with the Singaporean education think tank the HEAD Foundation. During her time in Singapore, she conducted a pan-Asian survey of PBL practices in the region, visiting over 20 institutions in 7 countries ranging from Indonesia to Japan. She published a number of papers on her findings of PBL in Asia and presented at a number of conferences and seminars across the region. In 2012, she also started her PhD under the guidance of Prof. Henk Schmidt, choosing the History of PBL as the subject matter. In 2013, she left Singapore and joined Erasmus University College as a PBL tutor, where she served on the first Programme Committee. In January 2015, together with her colleague Alex Whitcomb, she organised EUC's first study trip in Zimbabwe and founded her own NGO, 'FairFight', a charity dedicated to empowering young women in underprivileged socio-economic situation through martial arts. Today she is the Chair of the Board of Stichting FairFight, which now has 11 members and growing, with very successful projects in Zimbabwe and India that are run on a daily basis by local karate teachers.

Virginie Servant is a French national but has lived in 5 countries and travelled to over forty, so uses English as her first and favourite language. She also speaks French, Dutch and Spanish. She holds a 1st Dan black belt in Shitoryu Karate from the Netherlands Federation of Martial Arts (NFK). In 2016, she married Zoltan Miklos, a Hungarian and Romanian national and together they live in Den Haag.

ADDENDUM

PhD Portfolio

Name PhD student: Virginie F.C. Servant

Faculty: Erasmus University College

1. Teaching (Erasmus University College)	Year	ECTS
Urban Culture, Academic Community – PBL Tutor	2013	5
Origins – PBL Tutor	2013	5
Brain & Behaviour – PBL Tutor	2013	5
Institutions – PBL Tutor	2013	5
Science, Technology & Society – PBL Tutor	2014	5
The Scientific Method – PBL Tutor	2014	5
Art, Religion & Philosophy – PBL Tutor	2014	5
Markets & Organisations – PBL Tutor	2014	5
Big History – PBL Tutor & Course assistant	2014	5
Concept of Man – PBL Tutor	2014	5
Brain & Behaviour– PBL Tutor	2014	5
Art, Religion & Philosophy – PBL Tutor	2014	5
Zimbabwe Study Trip – Project Supervisor	2015	5
Man & Society – PBL Tutor	2015	5
Science, Technology & Society	2015	5
Big History – PBL Tutor & Course assistant	2015	5
Zimbabwe Study Trip – Project Supervisor	2016	5
Political Economy – PBL Tutor	2016	5
Science, Technology & Society – PBL Tutor	2016	5
International Relations – PBL Tutor	2016	5
Capstone project Ronald Maduro – 2 nd Reader	2016	5

2. Conference presentations & keynotes	Year	ECTS
“Models of PBL” – <i>Panel Session Speaker</i> ; International Conference on Legal Education; Udayana University, Bali, Indonesia.	2012	2
“The Many Roads to Problem Based Learning: Choices for Asian Institutions” – <i>Keynote Speaker</i> ; Symposium on Teaching and Learning Practices; School of Mathematics and Science; Singapore Polytechnic, Singapore.	2012	2
“Many Roads to Problem-Based Learning: A cross-disciplinary overview of PBL in Asian Institutions” – <i>Parallel Session Speaker</i> , 4 th International Research Symposium on Problem-Based Learning, Kuala Lumpur, Malaysia.	2013	3
“Problem-based learning: a short history” – <i>Plenary Forum Speaker</i> , 4 th International Research Symposium on Problem-Based Learning, Kuala Lumpur, Malaysia.	2013	1

REVOLUTIONS & RE-ITERATIONS

“Problem Based Learning in the Liberal Arts and Science Context” – <i>Parallel sessions speaker</i> , EAIR 35th Annual Forum in Rotterdam, the Netherlands.	2013	3
“A Short History of PBL” – <i>Expert Panel Speaker</i> , Opening of the UNESCO Centre for PBL, Aalborg University, Denmark.	2014	1
“PBL in Asia, Perspectives from observations and interviews” – <i>Keynote Speaker</i> , 3 rd APJCPBL, Phuket, Thailand.	2014	2
“Three intellectual disputes that shaped PBL” – <i>Keynote speaker</i> , IJCLEE, Mondragon University, San Sebastian, Spain.	2015	2
“Self-directed learning at a Critical Juncture” – <i>Parallel session speaker</i> , Critical Edge Alliance Conference, Roskilde University, Denmark.	2016	2

3. Publications (1 st author)	Year	ECTS
“A case-study of "comprehensive" undergraduate PBL programs in two Asian medical schools” – with C.Y. Kwan and T. Savitri Prihatiningsih Taiwan Journal of Medical Education	2013	5
“Some observations on a Hybrid PBL curriculum in medical education at Universiti Sains Malaysia” - Education in Medicine Journal	2013	5
“Investigating Problem-Based Learning Tutorship in Medical and Engineering Programs in Malaysia” – with E. Dewar. Interdisciplinary Journal of Problem-Based Learning	2015	5
“Thinking in Possibilities: Unleashing Cognitive Creativity Through Assessment in a Problem-Based Learning Environment” – with G. Noordzij, E. Spierenburg & M. Frens Journal of Problem Based Learning in Higher Education	2015	5
“Revisiting: Foundations of Problem-based learning, some explanatory notes” – with H. Schmidt. Medical Education	2016	5
“Origins and Development of PBL” – with H. Schmidt. Chapter in Wiley Handbook of PBL	2017	5

4. PBL Training Courses & Lectures	Year	ECTS
“Problem Based Learning: An Asian Student’s Perspective” – <i>Guest Lecturer</i> ; Guest Lecture; Faculty of Nursing, Fu Jen Catholic University, Taipei, Taiwan	2012	2
“Problem Based Learning: An Asian Perspective” – <i>Seminar Leader</i> ; Seminar on Problem Based Learning;	2012	2

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Faculty of Medicine, Fu Jen Catholic University, Taipei, Taiwan.		
“Asian Opportunities for the Danish Model of PBL” – <i>Seminar Leader</i> ; Seminar on Asian Opportunities; International Office of Roskilde University; Roskilde, Denmark.	2013	1
“Problem-based learning: An Asian Perspective” – <i>Seminar Leader</i> ; Seminar on Problem-Based Learning; Faculty of Education; Universiti Teknologi Malaysia, Malaysia.	2013	2
"PBL in non-medical fields of study" - <i>Seminar speaker</i> ; Seminar on Curriculum Design in PBL; University Malaya, Malaysia.	2013	1
“PBL tutor training” – <i>Participant</i> ; 2-day training course organised by RISBO at Erasmus University College.	2013	1
“Introduction to PBL” – <i>Training Coordinator</i> ; 2-day entry-level training course organised by the candidate at Erasmus University College for all its PBL tutors.	2015	3
“Problem-crafting in PBL” – <i>Training Coordinator</i> ; series of 2 workshops on problem crafting run by candidate with Gera Noordzij at Erasmus University College for course coordinators.	2015	2
“Assessment & course alignment in PBL” – <i>Training Coordinator</i> ; workshop on assessment run by candidate with Gera Noordzij at Erasmus University College for course coordinators.	2015	2
“PBL Training Workshop” – <i>Training Coordinator</i> ; 4-day entry-level workshop on PBL at Duy Tan University, Da Nang, Viet Nam.	2016	4
“Introduction to PBL” – <i>Training Coordinator</i> ; 3-day entry-level training course organised by the candidate at Erasmus University College for all its PBL tutors.	2016	3

Acknowledgements

Like the writing of any history, this book required an extensive amount of hands-on research. That means weeks spent in the archives of various institutions and the at-times-challenging hunting down of interviewees in order to collect oral history accounts. This is especially difficult given that most of the people who were present at the time of the beginnings of PBL have either moved on, retired or have unfortunately passed away. In addition, this research was carried out across three countries, namely Canada, the Netherlands and Denmark, adding extra language issues to the existing difficulties. The reason for highlighting these challenges is simply to give due and appropriate thanks to the people without whom this project would have fallen flat:

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ADDENDUM

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I set out to write a history of ideas, but this history has come alive and has become the history of people too. Many of these people I am grateful to have met in person through my research, but even those who have unfortunately passed away painted their vivid historical imprint on this treatise, bringing it to life. I sincerely hope that this book was as enjoyable to read as it was to write.