Fifty Years on: A Retrospective on the World's First Problem-based Learning Programme at McMaster University Medical School

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Abstract

There are many false ideas and a prioris about the history of problem-based learning in medical education, stemming from a dearth of historical studies of PBL. This study was conducted at McMaster University Faculty of Health Sciences and offers rigorous historical account of the first problem-based programme and lessons to be drawn from it. Archival data, oral history data from interviews with key participants to the history of McMaster and contemporary publications were triangulated using an inductive and hermeneutic method of historical analysis to produce the historical narrative in this paper. The key findings of this study are (1) PBL was founded by five disgruntled doctors in a time of global change; (2) McMaster did not pioneer the integrated systems approach, but it made it an integral part of problem-based learning; (3) The early PBL curriculum was fluid and variable (4) McMaster offered a loose educational structure dominated by small group learning; (5) The distinctive feature of problem-based learning, compared with all other progressive education methods, was the use of realistic problems at the start of the learning process; (6) Lectures and other top-down modes of knowledge transfer were conclusively not welcome at McMaster (7) Summative assessment was absent from the first problem-based learning programme.

1. Introduction

Fifty years ago, 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 20 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. Today, problem-based learning is commonly known as 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.[1] In addition, problem-based learning requires a great amount of time for self-study, and the number of lectures is therefore necessarily limited.[2]

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It is ironic that so many of these 'principles' of PBL are today taken as dogma, and the rules and requirements that medical education programmes 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. Thus, using historical methods, archive materials gathered from McMaster's Faculty of Health Sciences, little-known contemporary publications and oral interviews with some of pioneers of the McMaster programme, this paper aims to shine a light on some of the original features of McMaster's PBL programme of 1969. The findings presented in this retrospective provide some historical depth to the literature on PBL in medical education, where PBL has too often been taken either as a one-size-fits-all method, or as a loose contraption referring to progressive education in general. The aim of this research is to untangle some of the 'founding myths' of PBL and provide a historically grounded retrospective to guide future discussions on PBL. By discussing the World's first PBL programme, with its trials and errors, successes and failures, the authors hope to re-ignite the debate about the nature, purpose and potential of PBL in medical education today.

The historical research done for this paper proceeded using a process called 'triangulation', in which data from different types of sources is drawn and compared to feed an inductive and hermeneutical approach to historical analysis. This research compiled three types of primary sources: archive materials gathered from the official archive of McMaster University's Faculty of Health Sciences, contemporary publications authored by people involved in the construction of the first PBL programme, and oral history accounts of people either directly involved in the founding programme, or witnesses to its development. The archive materials were copied for later use, and the oral history interviews transcribed verbatim. The material was analysed using an inductive and hermeneutic approach to the data as advocated by the British historian and philosopher William Whewell.[3] The essence of this method is to build an intimate relationship between the historian, his data, and the meaning that emerges from that data. From this process, historical "facts" are born. But the process is not random: the historian starts with a hypothesis, that strengthens or gets rejected as it becomes confronted with data. How this hypothesis emerges is a question of research, prior knowledge, but also what Whewell called "creative insight".[3] In the case of this research, the author started by looking at easily available historical data such as contemporary publications to begin to form a hypothesis. This hypothesis was confronted with further triangulated historical data (archives, interviews), and refined or rejected, then further refined to hermeneutically embed it within a meaningful context.

The paper will present seven key findings of this research: (1) PBL was founded by five disgruntled doctors in a time of global change; (2) McMaster did not pioneer the integrated systems approach, but it made it an integral part of problem-based learning; (3) The early PBL curriculum was fluid and variable (4) McMaster offered a loose educational structure dominated by small group learning; (5) The distinctive feature of problem-based learning, compared with all other progressive education methods, was the use of realistic problems at the start of the learning process; (6) Lectures and other top-down modes of knowledge transfer were conclusively not welcome at McMaster (7) Summative assessment was absent from the first problem-based learning programme.

2. PBL was founded by five disgruntled doctors in a time of global change

Despite what has often been stated,[4] PBL was not 'invented' by Dr. Howard Barrows, a mistaken belief likely explained by Barrows' publication of the first book on PBL in 1980s, and all too eagerly rectified by Barrows himself.[5] Barrows in fact joined the faculty in the early 1970s and was far more influential in running the programme in the late 1970s. Instead, the McMaster's programme of 1969 was the brainchild of a team of doctors from Toronto Medical School led by founding Dean John Evans. Evans was only 35 years old and a junior associate in the Department of Medicine at the University of Toronto, making him the youngest Dean of a medical school in Canada at the time. However, Evans was not a hands-on planner. The practical aspects of the curriculum were therefore principally developed by William Spaulding, an Associate Professor of Medicine from the University of Toronto who became Evans' Associate Dean and right-hand man. Instrumental to the implementation of the curriculum were James Anderson, an anatomist with humanist beliefs about education, William Walsh, an internist with good connections to the health professions in Hamilton, and Fraser Mustard, a world-famous platelets researcher. Together with Spaulding, they made up the first Education Committee (EC) of the medical school, formed in 1966 and charged with developing its pedagogy and curricular content.

The decision to develop a new approach to medical education was not taken based on best-practice in educational sciences, or a strong belief in a particular educational philosophy. Certainly, the founders were inspired by certain authors like Abraham Flexner and Carl Rogers, but this connection is at best a background against which PBL was developed and not a causal relation.[6] A full investigation of the intellectual roots of PBL will be the subject of a subsequent paper but is not the subject or purpose of this research. In fact, as far as the founders were concerned, the prime reason for developing PBL was simply a disgruntlement with their own educational experience and a desire to offer future medical students a less boring experience. This has to be taken within the educational context of the time: as the founding Chair of Surgery Barb Mueller explained, these were the days of Woodstock and the hippies; change was in the air.[7] Though none of the founders were particularly political, they could not have been entirely immune to the unrest in university campuses around the world in the late 1960s, with particular reference to the massive increase in student numbers and the rejection of traditional authority. As we shall demonstrate in the first finding of this paper, they came at a time where timid innovations were already being made in medical education – such as at Western Reserve University. Thus PBL appeared neither out of the blue, nor as a deliberate effort to subvert traditional thinking, but more as an experiment in a time where there was a will, a large number of students, and money available for experimenting in medical education.

Thus, the structure of McMaster's first 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 gathered by the founders between the first meeting of the EC and the opening of the first academic year. We will now describe and analyse the five key historical features of this programme.

3. McMaster co-opted the systems-based curriculum and made it its own

Spaulding laid down the quadripartite structure of the three-year MD programme in a foundational memorandum dated from the Autumn of 1968,[8] and little was changed thereafter despite protracted discussions on the subject in the EC well into 1969. In fact, Spaulding reported the essentially the same structure in his retrospect on McMaster of 1991 (Table 1).[9]

As we can see, the programme consisted of an optional Summer Course, Phases I through IV, a

Table 1
Spaulding's plan for the McMaster medical curriculum in 1968.

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: 1 h per day in Phase I-III
Electives: 2×6 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

Horizontal Programme, electives, and a clinical skills course just prior to phase IV (there is no mention of skills training before that).[8] Within a couple of years, the Horizontal Programme was wound down as a separate entity[10] – presumably integrated into the rest of the programme – while the summer course was discontinued altogether.[11]

McMaster did not invent the systems approach used in Phase III. This curricular structure was borrowed from another North American medical school located at Western Reserve University (WRU). In 1952, WRU reformed its curriculum to replace monodisciplinary courses with "subject committees" that broke the curriculum down into what ended up being systems-based courses.[12] Spaulding visited WRU in 1967, and later credited their programme for PBL's systems-based units.[13] 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. 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.[9]

4. The early PBL curriculum was fluid and variable

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 Spaulding himself.[9] 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',[14] 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.

This freedom was not quite a free-for-all, *qua* intervention of Bill Spaulding – as recounted by James Kraemer, coordinator of the education programme from 1968, but was nonetheless extensive enough to cause some confusion:

> 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. (…) Ostensibly, these Planning Groups reported to Bill Spaulding who was overseeing the development of Phase 3 (…). 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 ~ these being the various information items with which they felt medical students of the day ought to be familiar and have appropriate learning resources or reading materials for.[15]

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 did not 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.[9]

A look at of some unit manuals from all three preclinical phases between 1969 and 1971 provides us with a contrasted picture of the structure of objectives. The Cardiolovascular manual for Phase III does not provide any objectives except to state more generally that 'the committee has attempted to produce an unstructured programme.[16] Students may elect to work on the various sections of the programme in any order determined jointly with their tutor'. 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.[17] Dickinson also included a dual labelling of his objectives in the 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'.[18] 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 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.[19]

5. Small groups were the basic unit of learning at McMaster

Although there is no clear reference to the provenance of the idea of small groups, they were a clear feature of the programme from the beginning. Mueller suggested that 'the 'tutorial' was adapted from the English tutorial systems of Oxford and Cambridge.[7] But 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.

We have references to the importance of small groups in the EC's thinking from 1968. It seems that small group learning was favoured because of its propensity to stimulate learning through group dynamics.[20] The theme of group dynamics was picked up by Barrows and Neufeld in an article from 1974:

> 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.[21]

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 of small groups at McMaster.

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.[22]

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. Based on the author's investigation of two dozen PBL-practicing institutions in prior research projects, the norm seems to be between 6 and 15 students.

6. Problems were the starting point of the learning process from day one

Like small groups, the problem-based format was decided upon from the start. We know that it was John Evans himself that championed the idea of using biomedical problems, in his first ever memorandum written for the MD programme in 1966.[23] 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.[7] 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 EC, as shown by letter from James Kraemer, 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.[24]

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.[25]

The last sentence in these minutes is clearly a clever subterfuge to avoid making any decisions, living on the hope that somehow things would work themselves out. In the resounding words of 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!'.[9]

Decisions on problems fell into place as 1969 was drawing on: students would begin their undergraduate medical education with patient problems. This was interpreted by Alan McNabb, in a letter to 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.[26]

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, microslides… The idea seems to have been: give them all of the resources and let them sort things out. But this begs the question: were the students assisted by lectures or not in this process?

7. The limited use of lectures in PBL

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.[27] 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.[28] 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 so 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.[20]

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 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.[29] In this paper, Huber suggested that 40% of student time should be spent on independent study and 20% in small group instruction. Anderson presented the paper to the EC in 1967, enjoining them to see a potential model for McMaster therein. It is interesting to note large proportion of time advised for self-study, as this is according to Schmidt one of the most crucial aspects of PBL.[2]

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. […][30]

This list, drawn up by the EC 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 confrontation with his tutor The tutor is to be available at the end of the day for informal consultation'.[31] He clearly opposed the idea that any substantial portion of time should be dedicated

to lecture-type exercises, as he wrote, with inescapable definitude: 'No lectures except to orientate and inspire'.[31] 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, organize their own study trips and self-study. 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 whole other host of 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.[32]

But the most developed depiction that we have of student time allocation comes from Jim Anderson, who penned the imaginary week of a student in the 'G.I. system'.[33] The diary included items 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 Lannec?) 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).

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.

8. There was no summative assessment at McMaster

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. 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.[34]

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. Norman remarked on this paradox, by noting that the policy was maintained until 1989, but then reversed in the face of increasing failure rates at the LMCC.[35]

This peculiar choice of (non)assessment methods did not come straightforwardly to the founders of McMaster. 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'.[36] However, it was not said in this instance what would interfere and what would not. Spaulding tentatively opened the debate with a suggestion to put together a sort of 'comprehensive' assessment system that would somehow promote the education objectives of the institution – leaving it up to the faculty group to determine how.[37] Opposing him, Anderson placed the first nail in the coffin of formal examinations by suggesting the use of the tutorial as appropriate setting for assessment:

> 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.[38]

To support his position, Spaulding put together a systematic table of possible examination methods, submitted to the Education Committee, in May 1969 (Table 2):

In this table, 'questions' indicates the choices that the EC had to make about the kind of assessment they were going to give the students.[39] 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.

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 reached well into the first year of the programme. Kraemer noted the outcome of the December 3 meeting:

> 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.[40]

On December 15, Walsh intervened in the debate to propose a compromise between the position of Spauld-

Table 2
Spaulding's learning methods and evaluation from may 1968.

Learning Methods and Evaluation	
(Learning Methods) Questions:	**(Evaluation) Questions:**
Student selection vs. staff prescription	Impressionistic vs. detailed, defined minimum
Unscheduled vs. scheduled	Pass-fail vs. detailed grades
Unsupervised vs. supervised	Sporadic vs. regular
Individual vs. group	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	Essay
Looking	Multiple-choice
Discussing	Quiz
Hearing	Simulation (performance)
Copying	Casual observation
Drawing	Clinical performance
Writing (creative)	Teaching (seminar, rounds)
Handling	
Examining patients	
Doing lab work	
Working out set problems	

ing 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.[41]

It seems, though, that by December 30th, Anderson had the last word on assessment as evidenced by a report in which his final recommendation echoed McMaster's policies: "*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".[42] This report the end of the debate, and so, McMaster's assessment fate was sealed until the realism of LMCC failure rates in 1989 sunk in. Reflecting on the failure of Anderson's assessment policies, Mueller noted that the dual tutor role as a "partner and evaluator" was impossible to uphold fairly in practice.[19]

9. Conclusion

This study of the key features of McMaster's 1969 pioneering undergraduate MD programme has brought to light a far more chaotic birth to one of the most popular alternative methods in medical education today than is commonly acknowledged. PBL was a product of its time, developed by people who had no real theoretical background in education but who were open to experimentation, and its key features are either borrowed from pre-existing educational innovations or developed as the result of a lengthy negotiation process between committees and managers, or in a trial-and-error mode. The resulting programme was nonetheless unique, offering students a different path to a medical degree than was hitherto possible. If there is one thing for PBL educators to take away from these findings, it is that this study tends to discredits a dogmatic approach to PBL in favour of a more

flexible approach adapted to each situation. After all, McMaster itself had anything but a dogmatic approach to its curriculum. This paper offered insights into a very limited proportion of the history of PBL, namely the first years of the world's first programme. There are many more areas of interest to investigate in the history of PBL in medical education: the intellectual influences that inspired PBL, the rise and confrontation of different schools of thoughts on the role of problems in the 1970s, the evolution of PBL as it transitioned to the Netherlands in 1974, the co-opting of the term PBL in non-medical fields… these investigations shall be the subject of subsequent papers.

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