

Tensions and co-existence

Exploring multi-faceted articulations of intentions of problem-based learning in higher education

Diana Stentoft

is associate professor in the field of Higher Education at Aalborg University. Her research is concerned with problem-based learning particularly in health science education. Diana is particularly interested in the various implementations of PBL in diverse settings and with the underlying theoretical assumptions of the problem-based approach to learning in higher education.

Abstract

This paper raises the issue of articulating intention as a means of positioning education and educational practices as useful and as offering a particular contribution to individuals and society. The paper explores the multifaceted articulations of intentions of problem-based learning, PBL, and the apparent co-existence of articulations of very diverse intentions despite potential tensions. The exploration identifies three distinct yet intertwined sets of intentions of PBL explicated in the articulations of PBL in current books and research papers. One, PBL as supporting the specific learning situation. Two, PBL as a pedagogy enabling students' development of specific competencies. And three, PBL as a pedagogy ensuring the delivery of efficient and employable human resources who are competent to meet broader societal demands. These very different articulations of PBL currently co-exist without much debate, however scratching the surface reveals potential tensions. These tensions for example become apparent when posing the question 'for who do we do PBL'? Do we do it for the students in order to enrich him or her as individuals and give them a stake in their own education? Or do we do it for the state, the company or

the organisation in order to deliver efficient and employable human resources?

Keywords Problem-based learning, higher education, intentions of education.

Problem-based learning in higher education

Although thoughts seemingly resonating with what could today be characterised as underpinning principles of problem-based learning, PBL have been articulated in a multitude of ways over the last century, PBL was not formally brought into higher education until the late 1960's. Drawing heavily on theories and philosophies of experiential learning and the active involvement of students in learning processes (e.g. Dewey, 1916) the formal introduction of PBL was attributed to the medical school of McMaster University in Canada. Here PBL was introduced as a pedagogical strategy intended to offer students possibilities to organise their learning around the situations of patients rather than dissociated disciplines of anatomy, physiology etc. (Boud & Feletti, 1997; Schmidt, 1983). Learning through authentic patient cases was intended to give students new directions for organising complex and extensive information and was assumed to be more fun (El-Moamly, 2010; Savin-Baden & Major, 2004). Since its emergence in higher education institutions around the world have adopted PBL in virtually all fields of education. Consequently, PBL has through the decades undergone considerable adjustments to accommodate the kind of learning associated to a variety of disciplines. Thus while medical education continues to organise PBL around patient cases (e.g. Albanese, 2010; Moust, Van Berkel, & Schmidt, 2005; Schmidt, 1983; Wood, 2003), other educational areas now implement PBL through anything from small scale courses to extensive projects (Kolmos, Fink, & Krogh, 2004). Despite obvious differences in the way PBL is implemented in educational practices there however appears to be some consensus on the key principles underpinning the approach (see for example Barrett & Moore, 2011; Barrows, 1986, 1996; Evensen & Hmelo, 2008; Savery, 2006; Savin-Baden & Major, 2004). PBL can thus be characterised as an approach to learning which:

- Has complex and authentic problems at the centre of learning
- Is centred around student activity
- Departs from the assumption that knowledge is constructed by the learner
- Is assuming self-directed learning
- Requires student activity and reflection to be meaningfully implemented
- Sees the role of the educator as a facilitator or supervisor
- Is based on student collaboration and learning in teams

From these underpinning principles follows some less clear considerations about what PBL might contribute or offer or rather the utility of PBL. This ambiguity is evident in the articulations of the intentions underlying decisions or argumentations in favour of PBL. The perceived utility of PBL thus becomes visible through articulations of intentions of PBL and in observing how these intentions are pointing in particular directions – towards learners, professions, or achievements. The aim of this paper is therefore to explore the articulations of PBL in more depth in order to uncover the breadth of intentions. This is relevant in order to fully comprehend the potential consequences of adopting principles of PBL and to strengthen awareness of potential conflicts and tensions embedded into the articulation of intentions of the approach. Despite the proliferation in institutions adopting PBL principles debates on the intentions of PBL have been more or less absent. Uncovering the intentions of PBL as articulated in research literature may therefore offer a preliminary and timely contribution towards a more open debate about the utility of PBL. The analysis below is thus guided by an overall question of how intentions and motives for PBL in higher education are made visible.

The following pages contain an exploration of the articulations of intentions of PBL as found in contemporary research literature on the approach. In these academic texts the implicit or explicit utility of PBL can be seen as located in the articulations giving reasons for adopting PBL in higher education. This explorative study focus on intentions articulated by researchers and thus does not take into account the articulations of intentions of PBL visible elsewhere e.g. in marketing and communication materials, in settings of teachers and students. The reason for a departure in the research literature is

that articulations provided here are often cited and mirrored in other spheres of communication as giving reasons or evidence for particular perspectives on matters of education, teaching and learning.

Articulating intentions of PBL in research literature

When reading through papers and books on education research few intentions are presented as to the choice and expected outcome of lecture based higher education. One could therefore arrive at the thought that the intention of this approach to teaching and learning through lectures, individual study and the authoritative professor figure is somehow taken for granted and does not stand in need of articulation. This would be in accordance with Wittgenstein's point that it is against an inherited background we come to understand the world (Wittgenstein, 1969). The influence of the tradition and background of higher education could therefore also explain why articulating intentions appeared particularly important at the emergence of PBL as an educational alternative. It was articulations made against this inherited background which made the problem-based approach to learning stand out as a real alternative. In this light articulations of the intention of PBL are not simply informative paragraphs enlightening students, teachers, employers and researchers. These articulations are at the same time serving the role of giving justification, delivering promises of the approach as well as implicitly offering critique of other approaches. In this way, articulations of PBL offer a challenge to the background which we have come to take for granted through hundreds of years of academia. From this understanding analysing articulations of intentions of PBL may offer insights into different ways of perceiving the learner and the very role of higher education.

The analysis below is explorative and is conducted based on research presented in recent introductory book chapters and journal papers in problem-based learning. Selected books on PBL published within the past two decades are included as are the five most recent research papers published in *Journal of PBL in Higher Education* as well as *Interdisciplinary Journal of PBL*. The latter journal covers all educational levels and here the most recent papers addressing PBL in higher education were selected. It should be noted that the relatively comprehensive research into issues of PBL in the field of medicine is reflected in the proportion of the papers analysed.

This paper is however about the need to see and acknowledge differences in articulations within a general educational approach, which spans across all areas of higher education, and medicine here thus only serve as a particularly well-documented example within a much broader debate.

Methodically, what follows is a document analysis undertaken with the desire to uncover how intentions of PBL is articulated in current research and whether tensions or conflicts in these intentions may exist and pose potential challenges to our understanding of PBL in higher education (Lynggaard, 2010). The analysis was conducted by asking an overarching question to each text: What is the utility of problem-based learning? From the results of the initial analysis emerged three distinct ways of articulating intentions of PBL in research which are presented and discussed below. As will be evident these three ways of articulating PBL in the research literature pose very different views on for which reasons and for whom we should adopt PBL in higher education. In his uncovering of the utilities of PBL in business studies through 40 years Rasmussen (2014) touches upon all three articulations of intentions and also acknowledge some of the tensions these articulations present to the understanding of PBL.

Articulation one:

PBL as enhancing students' experiences of learning

The first way of articulating intentions of PBL is centred on the student and his/her possibilities for learning in the specific context of higher education activities. Intentions of PBL are here seen as closely tied to specific learning activities where the approach is contributing towards students reaching the learning objectives of the activity in a pedagogically responsible manner. From this perspective the justification of PBL lies in its contributions towards the learning situation in itself rather than in a greater, long-term outcome to be measured in competencies at the end of education.

Derfoufi and colleagues adopted a case oriented PBL approach in a response to their concern that learners did not appear to reach desired learning outcomes. Their primary arguments for adopting PBL were that PBL offers a student-centred approach where stu-

dents are encouraged to engage with the subject matter and where deep learning is emphasised (Derfoufi et al., 2015).

Similarly concerned with the quality of learning situations Mühlentfelder and colleagues emphasise the need for qualified facilitators adequately trained to support both the process and content issues arising in students' learning processes when working with theoretical and practical conceptualisation of complex problems. They see PBL as a strategy tailored to meet the diverse needs of students in the actual learning situation relating to both their cognitive and meta-cognitive development (Mühlentfelder, Konermann, & Borchard, 2015).

In exploring students' attitudes towards group examinations in engineering Dahl and Kolmos (2015) indirectly articulate PBL as a structure supporting students' learning processes as they argue for the alignment of problem-based project periods and the situation of assessment in the examination. They see this alignment as expressed through the collaborative and group based situation being carried into the final examination.

PBL has also been articulated as an approach fuelling student motivation and thus preventing failure and drop-out in demanding first year computer programming courses. Lykke et al. (2015) emphasise how PBL contributes to students' development of particular skills in collaboration and team work, organisation etc. and how the inductive nature of the approach helps students give meaning to the work that they undertake during their education. It is further suggested that the making of meaning involved in PBL is leading to intrinsic motivation in students. Likewise Sakai and colleagues (2015) avoid engaging in a wider exposition of the intention of PBL and are engaged solely with the advantages and disadvantages of using senior students and experts as PBL facilitators. A similar approach is found in Jin et al's (2015) discussion of students' use of technologies in PBL tutorials and the possible implications for learning processes in health science educations.

When articulating intentions of PBL as supporting students' experiences of learning it could be argued that PBL can be seen as a specific strategy helping teachers and facilitators to organise learning processes. The utility of PBL thus lies in how the principles of the approach accommodate learner needs for fun, meaningfulness or motivation and in the support of the learner to reach education

and course specific learning objectives. Such articulations of intentions are limited to a didactical and pedagogical scope and to instrumental structures supporting learning in specific situations and settings and they thus appear in sharp contrast to articulations two and three presented below.

Articulation two:

PBL supports students developing specific competencies beneficial to the student in his/her professional working life

In these articulations authors extend the scope of the intention of PBL to include intentions beyond the specific learning situation. This means that the utility of PBL is attributed to students' development of competencies which they will come to need in their future professions and job functions.

Comprehending the implications of PBL Barrows lists specific educational objectives which he suggests can be realised through adopting a problem-based approach to learning in its classical case and patient-centred form in medical education (Barrows, 1996). These objectives include:

- The acquisition of an integrated knowledge base
- The acquisition of a knowledge base structured around the cues presented by patient problems
- The acquisition of a knowledge base enmeshed with problem-solving processes used in clinical medicine.
- The development of an effective and efficient clinical problem-solving process
- The development of effective self-directed learning skills
- The development of team skills

As one being involved in the very first conceptualisation of PBL in medicine it is noteworthy how the objectives set out by Barrows are overwhelmingly concerned with students acquiring skills and competencies directly related to the medical profession and less concerned with what PBL could potentially offer the individual student in his capacity as learner in the actual learning situation. In this adaptation a PBL approach becomes a means to reach higher objectives of education reaching well beyond the time spent in higher education institutions to obtain a degree.

Similarly addressing PBL from a perspective of medical education El-Moamly considers an extensive list of competencies which students in PBL arguably acquire to a greater extent than students from more conventional medical educations. These learning outcomes are presented primarily with a focus on the competencies which the individual student has the possibility to develop through his/her engagement with problem-based learning. Less attention is paid to demands and requirements made by the medical profession. Thus El-Moamly focuses on developing competencies of critical thinking, interpersonal skills and strategies for navigating in a stressful and complex working environment with large amounts of information (El-Moamly, 2010). Here it should be noted that although El-Moamly explicitly address the field of medical education the competencies highlighted as outcomes of engaging with PBL are of a general nature not exclusive to the field of medical education. Broadening the intentions of PBL further Mennin (2010) emphasises how students through PBL are offered possibilities to merge knowledge domains through their work in authentic contexts. In this lies a more implicit intention of PBL as a means to support and promote the development of competencies to handle the complexities of cross- and interdisciplinarity in the health professions and also beyond these professions.

As seen above in articulation two intentions of PBL are not limited to the immediate classroom or project situation. Rather the utility of PBL is seen as a strategy which enables students to develop cognitive and meta-cognitive competencies useful in their professional life after completing their educations. From this perspective PBL is not simply a remedy used by teachers and facilitators to ensure a smooth and satisfactory learning environment. Instead the intentions for utilising PBL reach beyond the classroom and into the desires of staff and entire institutions to prepare students for life after their education. From this perspective adopting PBL as an approach to learning also entails taking an active stance on which kind of students an institution aims to educate, and thus PBL institutions implicitly come to play a role in debates of the role and responsibilities of higher education.

**Articulation three:
PBL contributes towards delivering adequate human
resources into society**

Moving out of educational settings and the potential benefits of PBL to the individual student in the third articulation PBL is considered a way in which higher education can support the general development of societal, economic and technological realms.

This intention is evident when Engel articulates how PBL can serve as a way of learning contributing to the development of citizens in possession of the competencies and skills to be active learners through life and as able to handle and adapt to constant and rapid changes both in their professions and other aspects of life (Engel, 1997). This articulation is further seen when Hernandez, Ravn and Valero in their efforts to construct an alternative theoretical understanding of PBL from a socio-cultural perspective in several paragraphs point out how a problem-based approach to learning accommodates current societal needs for interdisciplinarity and competent solving of complex problems. They further suggest that PBL emerged as a response to changes in higher education settings towards new forms of knowledge construction (Hernandez, Ravn, & Valero, 2015).

In medical education Lu and colleagues articulate the intention of PBL in medical education as a means to facilitate development of a patient-centred and holistic approach to medical issues as well as students developing effective strategies for identification and solving of complex and dynamic medical problems (Lu & Chan, 2015). A similar focus on PBL as contributing to the medical profession as a whole is offered by Servant and Dewar in their comparison of tutoring in medical and engineering education. They assert that PBL in whichever of these fields takes into account the need to prepare students to enter into particular professions with ever increasing knowledge domains (Servant & Dewar, 2015).

The third articulation where PBL is seen as supporting development of relevant human resources is primarily evident in research texts addressing PBL in relation to specific professions. This leaves a question of how specific professions contribute towards shaping intentions of PBL – and other learning approaches for that matter. It further suggests that well defined professions may exert some power into the articulations of intentions of higher education as

work functions in these professions are clearly defined. Thus from this perspective the utility of PBL is attributed to the intentions of higher education institutions to accommodate the needs for skills and competencies expressed by professions and society at large.

Tensions and co-existence in articulations of intention of PBL

PBL offers an alternative strategy for organising higher education which breaks with roles of students and teachers well rehearsed over centuries and in research several ways of articulating the intentions of PBL have emerged as seen above. It could be argued that these articulations of intentions have come into existence as responses to an initial and substantial resistance from established institutions to acknowledge the justification of alternative learning principles as a feasible pathway towards university degrees of acceptable quality. Nonetheless, the significant differences in scope and perspectives on PBL demonstrated through the three articulations beg for more research and analysis. The analysis above clearly shows how researchers are not in agreement whether the utility of PBL is limited to a didactical instrument as in articulation one, a tool for enhancing development of particular competencies as in articulation two, or as a remedy whereby universities ensure that they deliver adequate human resources to society and professions as in articulation three.

The three articulations of PBL offer very different explanations of why adopting a PBL approach could be an attractive strategy in higher education and particularly articulations two and three may be seen as representing opposing positions on the role and responsibilities of higher education institutions as they emphasise the preparedness and readiness of students to manage their own lives on the one hand and the delivery of knowledge skills and competencies to satisfy needs of public and private sectors on the other. Thus tensions may exist and may even vary over time as the articulation of intentions of PBL may change. The way a university, a facilitator or a student will position themselves will to some extent depend on the context in which the positioning occurs. A student may well see the intention of PBL as being a learning approach enhancing and enriching his learning environment when he starts university. However when his education is complete he may offer a very dif-

ferent articulation of PBL in his meeting with potential employers. Consequently, the balancing of intentions of PBL against each other is complex and depending on specific contexts. The Danish professor Knud Illeris addressed this balancing act already in 1974 when he pointed out how learning departing in authentic problems on the one hand could contribute towards the needs of a capitalist society eager to employ human resources possessing the skills to dismantle and re-assemble complex problems. Yet at the same time introducing this kind of learning, he argued, also involved raising the awareness of the individual in terms of his possibilities and positioning in society which may open to questions and critiques counter to the desired outcomes of PBL (Illeris, 1974).

The implications of tensions in the articulations of intention of PBL are not well understood as indicated above, however it is safe to say that it is relevant to give some attention to the consequences such different articulations may have both for the understanding of what higher education contributes to society as well as to the individual student. This is also relevant when attempting to understand tensions between staff, students and management in institutions adopting PBL as a key approach. After all ever more universities move in this direction.

References

- Albanese, M. A. 2010. "Problem-based learning." in T. Swanwick (Ed.), *Understanding Medical Education: evidence, theory and practice*, 37-52. Chichester, West Sussex: Wiley- Blackwell.
- Barrett, T. and S. Moore (Eds.). 2011. *New approaches to problem-based learning: Revitalising your practice in higher education*. New York: Routledge.
- Barrows, H. S. 1986. "A taxonomy of problem-based learning methods." *Medical Education*, 20(6), 481-486.
- Barrows, H. S. 1996. "Problem-based learning in medicine and beyond: a brief overview." in L. Wilkerson and W. H. Gijselaers (Eds.), *Bringing Problem-Based Learning to Higher Education: Theory and Practice*, 3-12. San Francisco: Jossey-Bass Publishers.
- Boud, D. and G. Feletti 1997. "Changing problem-based learning: Introduction to the Second Edition." in D. Boud and G. Feletti (Eds.), *The challenge of problem-based learning (2nd ed.)*. London: Routledge.

- Dahl, B. and A. Kolmos. 2015. "Students' Attitudes Towards Group-based Project Exams in Two Engineering Programmes." *Journal of Problem Based Learning in Higher Education*, 3(2), 62-79.
- Derfoufi, S., A. Benmoussa, J.E. Harti, Y. Ramli, J. Taoufik and S. Chaouir. 2015. "Impact of Active Teaching Methods Implemented on Therapeutic Chemistry Module: Performance and Impressions of First-year Pharmacy Students." *Journal of Problem Based Learning in Higher Education*, 3(2), 1-15.
- Dewey, J. 1916. *Democracy and education*. New York: Macmillan.
- El-Moamly, A. 2010. *Medical Education in the New Millennium*. New York: Nova Science Publishers.
- Engel, C. E. 1997. "Not just a method but a way of learning." in D. Boud and G. Feletti (Eds.), *The Challenge of problem-based learning*, 17-27. New York: Routledge.
- Evensen, D. H. and C.E. Hmelo 2008. *Problem-based learning: A Research Perspective on Learning Interactions*. New York: Routledge.
- Hernandez, C., O. Ravn and P. Valero. 2015. "The Aalborg University PO-PBL Model from a Socio-cultural Learning Perspective." *Journal of Problem Based Learning in Higher Education*, 3(2), 16-36.
- Illeris, K. 1974. *Problemorientering og deltagerstyring: oplæg til en alternativ didaktik*. Odense: Fyens Stiftsbogtrykkeri.
- Jin, J., S.M. Bridges, M.G. Botelho and L.K. Chan. 2015. "Online Searching in PBL Tutorials". *Interdisciplinary Journal of Problem-based Learning*, 9(1), 1-14.
- Kolmos, A., F.K. Fink and L. Krogh. 2004. *The Aalborg PBL Model*. Aalborg: Aalborg University Press.
- Lu, J., and L.K. Chan, 2015. "Differ in Socio-Cognitive Processes? Some Comparisons Between Paper and Video Triggered PBL." *Interdisciplinary Journal of Problem-based Learning*, 9(2), 1-11.
- Lykke, M., M. Coto, C. Jantzen, S. Mora and N. Vandel, 2015. "Motivating Students Through Positive Learning Experiences: A Comparison of Three Learning Designs for Computer Programming Courses." *Journal of Problem Based Learning in Higher Education*, 3(2), 80-108.
- Lynggaard, K. 2010. "Dokumentanalyse." in S. Brinkmann and L. Tanggaard (Eds.), *Kvalitative metoder en grundbog*, 137-151. København: Hans Reitzels Forlag.
- Mennin, S. 2010. "Introduction: sustainability of PBL and innovation in medical education at Maastricht University." in H. van

- Berkel, A. Scherpbier, H. Hillen and C. van der Vleuten (Eds.), *Lessons from problem-based learning*, 1-4. Oxford University Press.
- Moust, J., H.J.M. Van Berkel and H.G. Schmidt, 2005. "Signs of erosion: Reflections on three decades of problem-based learning at Maastricht University." *Higher Education*, 50, 665 - 683.
- Mühlfelder, M., T. Konermann, and L. Borchard, 2015. "Design, Implementation, and Evaluation of a Tutor Training for Problem Based Learning in Undergraduate Psychology Courses." *Journal of Problem Based Learning in Higher Education*, 3(2), 37-61.
- Rasmussen, J. G. 2014. "Problembaseret læring og erhvervsøkonomi - tendenser gennem 40 år." in J. G. Rasmussen (Ed.), *Problembaseret Erhvervsøkonomi. En antologi om praksis i problembaseret læring*, 19-37. Aalborg: Aalborg Universitetsforlag.
- Sakai, D. H., M. D'Eon, K. Trinder and R.T. Kasuya, 2015. "The Effect of Senior Medical Student Tutors Compared to Faculty Tutors on Examination Scores of First- and Second-Year Medical Students in Two Problem-based Learning Courses." *Interdisciplinary Journal of Problem-based Learning*, 10(1), 1-11.
- Savery, J. R. (2006). "Overview of problem-based learning: definitions and distinctions." *The Interdisciplinary Journal of Problem-based Learning*, 1(1), 9-20.
- Savin-Baden, M. and C.H. Major, 2004. *Foundations of Problem Based Learning*, Society for Research into Higher Education & Open University Press.
- Schmidt, H. G. 1983. "Problem-based learning: rationale and description." *Medical Education*, 17(1), 11-16.
- Servant, V. F. C. and E.F.A. Dewar, 2015. "Investigating Problem-based Learning Tutorship in Medical and Engineering Programs in Malaysia." *Interdisciplinary Journal of Problem-based Learning*, 9(2), 1-17.
- Wittgenstein, L. 1969. *On Certainty*: Blackwell.
- Wood, D. F. 2003. "ABC of learning and teaching in medicine - Problem based learning." *British Medical Journal* 326, 328 - 330.