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Bertel, Lykke Brogaard; Kolmos, Anette; Ryberg, Thomas

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Exploring the Near Future or Next Practice of Problem-Based Learning

*Lykke Brogaard Bertel, Anette Kolmos and Thomas Ryberg **

INTRODUCTION

Dear Reader,

Problem-based learning (PBL) has become a widely accepted pedagogy in many higher education institutions. However, emerging trends increasingly invite us to challenge, develop, criticise or expand our conceptualisations and practices of PBL.

One such trend is the digitalisation of higher education, where digital technologies are reshaping not only disciplines, but also how lecturers teach and supervise, how students collaborate, and how lecturers and students can practice PBL. New blends between online and on-site teaching and learning are emerging and enabling the development of new hybrid PBL models that seek to harness the opportunities afforded by digital technologies while remaining firmly grounded in a commitment to students' mutual learning, sense-making and collaborative engagement.

Another trend is the institutionalisation of PBL in higher education. Rather than PBL being pursued mainly in single courses by individuals or small teams of lecturers, we are seeing a move towards institutions increasingly challenging traditional teaching models in higher education and rethinking programmes, the curriculum, or even the entire institution according to principles of PBL.

Finally, a trend of conscientisation is emerging, where PBL is seen as a means to raise critical consciousness around issues such as environmental and social sustainability.

* Lykke Brogaard Bertel, Aalborg Centre for Problem Based Learning in Engineering Science and Sustainability under the auspices of UNESCO, Department of Planning, Aalborg University, Denmark
Email: lykke@plan.aau.dk
Anette Kolmos, Aalborg Centre for Problem Based Learning in Engineering Science and Sustainability under the auspices of UNESCO, Department of Planning, Aalborg University, Denmark
Email: ak@plan.aau.dk
Thomas Ryberg, Aalborg Centre for Problem Based Learning in Engineering Science and Sustainability under the auspices of UNESCO, Department of Planning, Aalborg University, Denmark
Email: ryberg@plan.aau.dk

Rather than simply being an effective teaching strategy, PBL is increasingly seen as a pedagogy for students to engage as critical change agents with complex real-world grand challenges such as sustainable development, social justice and equity.

These trends together can potentially trigger the design and development of entirely new types of PBL models and environments that explore hybridity across different dimensions such as online/offline, disciplinary/interdisciplinary, local/global, and group/complex network and encourage higher education to move beyond a narrow focus on disciplinary competences and employability towards engaging students as critical learners and change agents who actively participate in an increasingly complex, global and network-based society.

This special issue presents ten research papers that challenge, develop, criticise and expand our current conceptualisation of PBL from different theoretical, conceptual and methodological perspectives and contribute to further explore and unfold visions for the near future and next practice of PBL. In this way, this special issue is aimed at an audience that is actively involved in developing near future and next practices of PBL as well as the theoretical and methodological frameworks for understanding, analysing and envisioning such PBL practices.

The papers address these emerging trends, changes and practices on different levels, at a student/individual, student/group, course/curriculum, and institutional level.

The first paper (Scholkmann and Lolle) analyses the engagement of students from different study programmes in a series of reflective activities aimed at making them more aware of their professional competence development. Their reactions were analysed and the insights gained are summarised into a model that can help teachers to design pedagogical opportunities for meaningful reflection in higher education.

The second paper (Clausen) investigates the development of attitudes and behaviours conducive to self-directed learning in Bachelors students enrolled at a PBL university, applying a statistical instrument. The study reveals that the students become more self-directed throughout their studies, and that the progression happens in two distinct steps. Students develop their ability to be self-regulating during their first year and gain more confidence in their ability to administer and direct the processes during their second. The paper provides possible theoretical explanations for this development, as well as implications for near future and next practice of PBL.

The third paper (Velmurugan, Stentoft and Davidsen) presents findings from an analysis of the interactions in a group of PBL engineering students. The study focuses on the negotiation of disagreements between group members and suggests that conversation

structure has a profound impact on whether any given student suggestion is accepted and implemented in the group project. The paper contributes to the area of student-centred problem identification, which is an under-researched and hard to access area of PBL, and suggests further studies to elaborate on the findings.

In line with this, the fourth paper (Gyldendahl Jensen, Gade, Madsen, Andersen and Olsen) applies Dewey's concept of sequential inquiry processes to create and test new ways of scaffolding PBL learning sequences to help students grasp some of the abstract learning concepts that characterise PBL, such as "problem and theory identification" and "designing the prototype". The results suggest that the students achieved an increased understanding of the concepts and understanding of the processes of problem-based work. The discussion suggests that the increased scaffolding might hamper students' development of self-directed learning, but that the trade-off might be worth it, particularly during the first few semesters.

The fifth paper (Svarre Kristensen, Bruun-Pedersen, Kofoed and Andreasen) addresses these themes at a curriculum and semester level and looks at IT initiatives to help better integrate courses and project work into a PBL semester. The findings suggest that a shared language to support interdisciplinary communication and coordination across all activities of a semester can mitigate some of the problems of integration, but that it requires a large investment of time and effort. A common semester theme is suggested as something that might help support cooperation and integration in current and near future PBL practices.

In line with these reflections on digitally supported PBL, the sixth paper (Simboeck, Marksteiner, Machacek, Wiessner, Gepp, Jessenberger, Weihs and Leitner) presents findings from a survey study conducted in the immediate aftermath of the Covid-19 pandemic lockdown, which included a switch from hybrid on-/off-site sessions to a completely online teaching format. The findings suggest that the on-site activities were particularly difficult, if not impossible, to replace with online sessions in a satisfactory way. The hindrance to communication and the lack of access to laboratories during the lockdown especially were very difficult problems to mitigate, which highlights important questions and challenges related to online and on-site teaching and learning in future potential hybrid PBL models.

The seventh paper (Boelt, Kolmos and Bertel) investigates the prevalence of formulations of generic competences in formal curricula at a PBL university. The findings suggest that the curricula have very few explicit mentions beyond the first semester, thus risking that such knowledge, skills and competences become tacit to the point where expressing and relating these to the development of a professional identity might be hindered. The authors argue that this problem might be mitigated by the revision of curricula with

integrated generic competences throughout, suggesting that an elaboration of generic competence frameworks is needed for these to be properly integrated in future PBL curricula.

The eighth paper (Nariman) investigates how PBL can be applied to increase low-income native Hawaiian students' interest in and motivation to enter the STEM-related workforce through a coherent set of experiences. The findings suggest that technology-enhanced PBL with a focus on STEM and industry collaboration allowed the students to develop interest, motivation and capacity, and that the students' exploration of the impact of problems in their local area especially helped them understand the severity of the problems and thus motivated them further.

The ninth paper (Montoya, Peterson, Kinslow II, Fruchter, Fischer and Bustamante) is an investigation of project-based Applied STEM Career and Technical Education (AS-CTE) workforce pathways in Silicon Valley, and the barriers historically marginalised groups face when trying to matriculate into the highly skilled workforce. Through ethnography, the authors observed that when social mobility was added as a metric of high quality PBL in a predictive ontology framework for education success, an improved level of attendance was observed, thus arguing for social mobility to be added as a metric of near future and next practice PBL AS-CTE program outcomes.

Finally, the tenth paper (Bertel, Kolmos and Boelt) explores normative scenario thinking as an approach to educational development, presenting the first steps and initial findings from a process of normative scenario development within a PBL university. The aim of this process was to identify and extrapolate key trends and core values informing the development of future scenarios for the conceptualisation and implementation of PBL at the university in a digital age. The methodology is exemplified through the analysis of a specific scenario related to project variation and reflection, and the initial results show how value-based and problem-oriented approaches to scenario development can support collaborative exploration of emerging futures, facilitating innovation and transformation in PBL models at a systemic level.

We hope that you will enjoy reading.