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New contribution to PBL?

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ORIGINS OF PBL

During the 1960s and 1970s several reform universities were established. Some of the reform universities were established with a new educational model. McMaster University, Canada (1969), followed by Maastricht University in the Netherlands (1976) started out with problem-based learning where groups of students learned content knowledge by studying cases. This more case and problem-based learning model was especially applied in medicine – but at Maastricht it was an institutional approach across subject areas (Barrows, 1996; de Graaff & Bouhuijs, 1993). In Sweden, Linköping University was established in 1975 and adopted problem-based learning in medicine in 1986 (Dahlgren, 2002; Hanberger, Persson, & Bergdahl, 2008).

At the same time, Roskilde University and Aalborg University were established in Denmark with a slightly different model called problem-oriented and project-organized learning. For both Danish universities, this was an institutional approach across all faculties and students worked on socially relevant problems as a starting point for projects (Bitsch Olsen & Pedersen, 2005; Kolmos, Krogh, & Fink, 2004).

The Danish models are different from the McMaster and Maastricht model in terms of both the organization of the learning process and the learning product; however, the learning principles behind the models are very similar (Kolmos & de Graaff, 2014). Furthermore, the last 20 years of problem based and project based learning (PBL) implementation around the world indicate that institutions/programmes utilize elements of the two original models as it fits the learning outcomes. Today, the literature clearly indicates that the original models are pragmatically merged and applied in many different ways all over the world – and is mostly referred to as problem and project-based learning (PBL) (de Graaff & Kolmos, 2006; Kolmos & de Graaff, 2014).

PBL reform universities have played a tremendous role in changing higher education and have served as living laboratories in which it is possible to get inspiration.

PBL IN SWEDEN

Sweden has had its own history of PBL and it may not have been the most commonly used student-centred pedagogy. Without claiming that I know the history of PBL in Sweden, there are some landmarks that have been visible from outside Sweden. Linköping University, as one of the reform universities, has introduced new models for teaching and learning, although never as general institutional models. PBL was introduced in the medical field in 1986 as the second medical education to do so following Maastricht (Hanberger et al., 2008). But there have been no institutional PBL approaches—PBL has been implemented more in classrooms, single courses, or individual programmes. As in many other parts of the world, it has been the health area that has utilized the case-based PBL approach. Research on and conceptual development of PBL is found especially at Linkoping University and Lund University (Dahlgren, Hult, Dahlgren, Hård af Segerstad, & Johansson, 2006; Egidius, 1991, 1999).

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During the 1990s, a European network on PBL called UNI-SCENE (University Student Centred Network) was established involving the universities of Linköping, Roskilde, Aalborg, and Maastricht. A few conferences were held in connection to the university anniversaries at Linköping and Maastricht in 1995 and 1996; but after a few other events it ended. These activities was an initiative from management and educational researchers and it was hard to create interest among the university staff to participate as it was during a period where the disciplines dominated as a phase in development, similar to development at McMaster university going from a contextual to disciplinary approach in PBL development (Neville & Norman, 2007). Furthermore, the call for educational reforms coincided with the announcement of the Bologna process in 1999, so the UNI-SCENE network was somewhat too early.

In Sweden, PBL has not really been associated with engineering education to the same degree as it has in Denmark. However, Sweden has contributed worldwide by the development of the CDIO model that was developed by KTH, Chalmers, and Linkoping (Crawley, Malmqvist, Östlund, & Brodeur, 2010). CDIO stands for Conceive, Design, Implement, and Operate and is today a worldwide society with more than 120 institutional members. CDIO is much more than PBL as it also involves series of criteria on, for example, faculty training, quality assurance, professional courses, etc. Although there is no claim of utilizing PBL learning principles, there are clear synergies in the teaching and learning approaches between PBL and CDIO (Edström & Kolmos, 2014).

PBL and methods of student-centred learning

PBL has not been the only pedagogy that has dominated educational change. There has been a trend of more student-centred learning activities such as case-based learning, inquiry-based learning, active learning, problem solving, scenario-based learning, etc. (Savin-Baden, 2014). For all of these different models, there are differences in terms of the degree of student involvement in identification of the problem, the role of the teacher, the organization of the learning process, and assessment.

What is really important for a sustainable curriculum is that flexibility is built into the structure. Students should try out different learning methodologies, and by reflecting on the differences they may become more aware of work and learning variations. Reflection on one's own learning process by comparing different ways of learning has been shown to be very efficient for the learning of process competences such as collaboration, project management, conflict management, etc.

Case-based PBL as practised in many medical schools can mean large investments in the development of cases. To justify such investments, cases will have to last for a long period. Consequently, there is a danger that PBL ends up more like a textbook approach instead of being a self-directed learning approach where students can choose the problems they want to work on. The same lack of flexibility also exists in the project-based approach that is carried out as more task-based projects defined by teachers and given to students. Flexibility in PBL does require that the problems can be new and defined for each project, which indeed also involves students identifying the problems. This more open and participatory approach or self-directed learning is an important element for increasing motivation in learning.

It is this type of learning philosophy that is so important to keep as a guiding principle for the organization of curriculum practice. As PBL and other forms of student-centred learning spread around the world, variation in PBL practices also increases and there are now thousands of hybrid variations of cases versus problems, narrow problems versus open/ill structured problems,

small projects/versus longer projects, etc. Honestly, reviewing the literature and learning about these new practices, it is not always true that students have a participatory and self-directing influence in the learning process and often students' decisions are narrowed down to a few choices to fit into a narrow discipline approach. Maybe this will be okay as part of an overall scaffolding of students' learning and introduction to more active learning; however, this will not be based on the PBL philosophy.

Advanced and complex PBL models need to go across disciplinary borders to frame contextual problems and allow students to work on the problems longer than single courses will allow. This does not mean that teachers should not go for more active learning in single courses, but more to emphasize that there is a need for a taxonomy of different types of student-centred learning methodologies going from small cases in single courses to a more comprehensive institutional case-based PBL model or a problem-based and project-based model.

PBL, RESEARCH, AND ENGAGEMENT

Another aspect I think is very important to stress is that change to PBL is not about beliefs or attitudes – it is about research, documentation, and evidence of improvement of student learning. There is research documentation that improvement of skills and competences can be found within several educational programmes (Dochy, Segers, Van den Bossche, & Gijbels, 2003; Hmelo-Silver, 2004), deeper learning strategies and an increase of perceptual motivation (Bell, 2010; Galand, Bourgeois, & Frenay, 2005; Galand, Raucent, & Frenay, 2010), and even higher grades (Graham, 2012). The research literature on PBL is extensive, although there are a substantial number of case descriptions as well belonging more to categories of best practices.

Of course engagement and involvement are two very important elements when implementing PBL among academic staff and students. No matter if it is at a narrower course level or at a departmental level, a change of teaching and learning methods will only happen if there are engaged change agents and academic staff involved. Knowledge of new methods for teaching and learning is another critical aspect combined with the need for training. It is crucial to train staff and let staff experience new practices (Kolmos, 2002).

THE ARTICLES IN THIS ISSUE

There are four contributions in this special issue on PBL. As such these contributions reflect some of the current research questions within existing PBL frames on how to practise a more student-centred learning curriculum.

The first contribution by Donnér and Edgren summarizes some of the literature on PBL. They have conducted a literature review to determine the question if PBL is a better way to teach and learn. Their answer is yes – if PBL is properly implemented – and this involves a systematic approach to the curriculum where PBL is not only used heuristically in a single course by one teacher, but also serves as an integrated part in an entire curriculum.

The second contribution is written by Setterud, Johansson, Edgren, Amner, Person, Segersten, Uhlin, and Lidskog and focuses on the training aspect by comparing four different types of tutor training for PBL. The trainings share a lot of the same theoretical elements and training for practice, but the design of the courses is different. The response from the participants indicates that no matter the course design, there seems to be widespread satisfaction with the introductiory workshops to tutoring. What this result really indicates is that academic staff need training for new educational practices in the classroom and there is not a lot of research on training or the impact of training.

The third article is in Danish written by Winther Hansen and Hatt. They report on an experiment with inter-professional learning within a PBL frame where they have integrated role-play. The results indicate that the combination of PBL and role-play where students have the possibility of acting is a very fruitful way of learning inter-professional skills and competences.

The fourth article reports on pre-PBL experiments in the classroom. Wedelin and Adawi experiment with alignment of case-based reasoning and cognitive apprenticeship in a course on mathematical modelling with the argument that scaffolding in PBL is important and that there should be stages of student centred learning like problem-solving before introducing PBL to students.

ARE THESE NEW CONTRIBUTIONS?

There is a lot of literature on PBL, and as such it is also relevant to ask if this issue contributes new knowledge to the pool of existing research knowledge? My answer would be yes and no. Yes, this is new knowledge as it reflects state-of-the-art of PBL research and development in Sweden with contributions from Denmark. It indicates that PBL is widely used by several universities and in several programmes, and that there is a Swedish history for PBL that may not be known worldwide. On the other hand, the articles do not contribute any new theoretical insights or new research results, but confirm already existing knowledge and there is a lot of research that does the same.

However, this issue could create a new start by re-activating debates on student centeredness and how to develop a learning philosophy that underpins this goal. It could be beneficial to cross medicine/health, social science, humanities, science, and technical subjects to extract and conceptualize the core learning principles. What matters is how the learning process meets students' cognitive and emotional pre-requisites and transforms this into relevant and future-oriented knowledge, skills, and competences.

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