



Published online: 9-6-2017

Guest Editors' Introduction: Problem-Based Learning—Promoting Competences, Shaping the Future

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IJPBL is Published in Open Access Format through the Generous Support of the [Teaching Academy at Purdue University](#), the [School of Education at Indiana University](#), and the [Jeannine Rainbolt College of Education at the University of Oklahoma](#).

Recommended Citation

Müller, C., Schäfer, M., & Thomann, G. (2017). Guest Editors' Introduction: Problem-Based Learning—Promoting Competences, Shaping the Future. *Interdisciplinary Journal of Problem-Based Learning*, 11(2).

Available at: <https://doi.org/10.7771/1541-5015.1731>

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THE INTERDISCIPLINARY JOURNAL OF PROBLEM-BASED LEARNING

GUEST EDITORS' INTRODUCTION

Problem-Based Learning—Promoting Competences, Shaping the Future

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and Geri Thomann (Zurich University of Teacher Education)

Keywords: problem-based learning, competency orientation, conference

Introduction to This Special Issue

In recent years, competency orientation has become a primary focus of educational debate (e.g., Bergsmann, Schultes, Winter, Schober & Spiel, 2015; Zlatkin-Troitschanskaia, Shavelson, & Kuhn, 2015). Competencies are understood as cognitive abilities and skills to solve specific problems associated with motivational, volitional, and social dispositions for using these skills and abilities in variable situations (Weinert, 2001). The focus on competence has shifted attention from the development and assessment of general cognitive abilities to more complex ability constructs related to real-world contexts (Koeppen, Hartig, Klieme, & Leutner, 2008). Problem-based learning (PBL) and related approaches such as project-based learning and inquiry-based learning have their strengths especially in long-term retention and skill development (e.g., Strobel & Van Barneveld, 2009). They are seen as promising methods of establishing competence development in educational courses, thereby providing a comprehensive basis for promoting learning, processes, and the skills necessary to operate effectively in professional and private life.

The conference “Problem-based Learning 2016: Promoting competences—Shaping the Future” had the goal to illuminate, present in a differentiated way, and critically discuss from different perspectives the topics of competence orientation, PBL, and related approaches. Furthermore, recent scientific findings on cognitive psychological principles and the integration and use of ICT in the context of Problem-Based Learning were presented. The conference, which took place June 16–17, 2016 in Zurich, was a cooperative venture, jointly implemented and sponsored by the Careum Foundation, the Zurich University of Teacher Education (PH Zurich), and the Zurich University of Applied Sciences (ZHAW).

The 12 papers in this special issue discuss the topics of the conference: (a) Problem-based Learning and competence development, (b) implementation and evaluation of problem-based learning, and (c) learning technologies and problem-based learning as well as the related questions from different perspectives.

Problem-Based Learning and Competence Development

Dieter Euler and Patrizia Kühner analyze how problem-based assignments may develop ethical and reflective competencies. Using a design-based research approach, they describe the results of the first two evaluation cycles and the adjustment of assignment designs for future research.

Rita Kumar and Brenda Refaei implemented Problem-based Learning for an academic writing course. Their findings suggest that students' critical thinking about writing improved with the use of PBL pedagogy.

Mirjam Brassler and Jan Dettmers explore the potential of problem-based learning and project-based learning for interdisciplinarity in a comparative study. The results of their multilevel model indicate that problem-based learning enhances students' interdisciplinary competence more than project-based learning.

Peter Rillero and colleagues discuss a problem-based learning model of a teacher college that should foster mathematics and science education and, additionally, should enhance the use and development of language for English language learners.

Regula Grob, Monika Holmeier, and Peter Labudde explore what kinds of measures support science teachers in implementing formative assessment activities in inquiry-based science education, and they discuss implications for implementation.

Implementation and Evaluation of PBL

Joi Merrit and colleagues conduct a literature review exploring the effectiveness of problem-based and project-based learning in mathematics and science in early elementary school to grade 8. The review found that PBL is an effective method for improving K–8 students' science academic achievement.

Laura Hemker, Claudia Prescher, and Susanne Narciss implemented PBL in the field of teacher education. In their paper, they outline their didactic approach and discuss the results, which show benefits of the approach but also room for improvement.

Marie T. Stanton, Suzanne Guerin, and Terry Barrett present and discuss the impact of PBL in an MSc Ultrasound program. They found several changes in the students' approach to clinical practice, which led to the development of more patient-centered, evidence-based, and proactive clinical practice.

Marit Wijnen and colleagues describe the implementation of PBL in a bachelor's program of a Law School. They report positive changes in students' study activities and academic achievements, discuss the implementation problems, and give recommendations for how to deal with them.

Tanja Müller and Thomas Henning show how Problem-based Learning was introduced in a BSc physics program. They present their adoption of PBL and reflect on some implementation problems and the implications.

Learning Technologies and Innovation for PBL

Adam Hendry and colleagues describe the evolution of a constructivist instructional model in a secondary school in Australia, resulting in a hybrid flipped PBL model. They present first research findings and discuss the effects of whole school pedagogical change.

Sharon Dole, Lisa Bloom, and Kristy K. Doss examine the impact of a hybrid teacher course facilitating problem-based and project-based learning on the students in grades 1–9. Their qualitative analysis shows the teachers reported benefits in terms of learners' attitudes and behaviors as well as student learning preferences.

The papers in this special issue demonstrate from a theoretical and practical perspective how, in selected contexts and under specific conditions, problem-based learning (and related learning approaches) promote competence orientation in educational institutions. In the future development and research of PBL, the focus should not only be on isolated competencies, but all the competencies relevant to a course of study should be assessed simultaneously and comprehensively to meet the requirements of constructive alignment (Biggs, 1999). As Barrows and Kelson (1995) emphasized,

problem-based learning is an appropriate approach to develop advanced (occupational) skills such as effective problem-solving competencies, collaborative and communicative competencies, and competencies in self-directed learning. For this purpose, differentiated competence profiles for the study programs as well as corresponding criteria rubrics are required. Furthermore, processes and eventually electronic tools are necessary to assess the development of competences continuously and to provide the involved educational actors (students, lecturers, program managers) with specific information so that they can optimize their teaching and learning processes in PBL. Such a comprehensive competency development and assessment system is a huge challenge for an educational institution but may also give important research insights into the effectiveness of problem-based learning in a holistic sense.

Acknowledgments

We would like to thank all the contributors for their papers, the IJPBL editors, Drs. Michael Grant and Krista Glazewski, and the excellent support provided by their editorial assistant, Ms. Ai-Chu (Elisha) Ding. We also would like to thank all our reviewers who have contributed to this special issue: Daniel Ammann, Tarrey Banks, Kristy Bloxham, Tom Brush, Dieter Euler, Monica Feixas, Karl-Heinz Gerholz, Krista Glazewski, Andi Gomoll, Ulrike Hanke, Young Hoan Cho, Hans-Jürg Keller, Victor Law, Cécile Ledergerber, Maren Lübcke, Gamze Ozogul, Drew Polly, Gabriele Schroeder, Stephan Schumann, Renate Schwarz-Goavers, and Ying Xie.

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