

# Digital Problem Based Learning for Facilitating the Acquisition of Collaborative Competencies

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## Abstract

Is Networked Learning (NL) and Problem-Based Learning (PBL) the future of education to foster collaboration? Networked learning has been proposed to be combined with PBL. Both are pedagogies and philosophies influenced by traditions of open learning, radical pedagogies and humanistic educational ideas.

Problem-based learning is a constructivist, student-centered, and problem-based approach used at the medical education at Aalborg University (AAU). During COVID, AAU fast-tracked the implementation of Digital PBL (DPBL) methods. Digital PBL opens new possibilities for collaborations across platforms and holds a potential to improve learning. This potential has yet to be released through systematic efforts to understand the possibilities in the context of medical education. The curriculum at the medical education at AAU is centered around the seven roles of physicians originally described in the Canadian framework, CanMEDS. Healthcare systems becomes increasingly complex, interconnected, and rely on interdisciplinary teamwork. The Collaborator role thus becomes more important than ever before. Physicians are expected to excel in clinical expertise and collaborate effectively with other healthcare professionals, patients, and families.

The specific focus on collaboration is a good example of alignment between PBL-, NL pedagogy and the CanMEDS framework, and could be important to further exploration using DPBL.

This study will investigate the possibilities of DPBL within the medical education at AAU by exploring and testing digitally supported pedagogical design options for facilitating the acquisition of collaborative competencies.

This explorative sequential mixed-method study will explore user-needs and perspectives using DPBL in the medical education. This contextualized knowledge will inform the development of a new teaching intervention aimed at enhancing the Collaborator role. It will be evaluated using quantitative measures of student engagement, time requirements, satisfaction and self-report learning outcomes. The data will be merged with focus group interviews to gain an in-depth understanding of the quantitative results.

The theoretical background will be learning design, including constructivism. This approach will be employed using the ACAD-model. The DPBL will include a digital element, the podcast media, and a pedagogical practice encouraging the medical students to engage actively in the learning process. This is facilitated by podcast production in groups.

At NLC24 the findings of the user-needs and perspectives will be presented and interpreted as part of the design and frame of the podcast intervention. The intervention will take place in autumn 2024 and this can answer if NL and PBL is part of the future education to foster collaboration.

## Introduction

Networked Learning (NL) was defined in 1998 as “learning in which information and communications technology (ICT) is used to promote connections: between one learner and other learners, between learners and tutors; between a learning community and its learning resources” (Goodyear, P., Hodgson, V., & Steeples, C., 1998). This definition has endured remarkably over time however, as Goodyear commented, “while the richest examples of networked learning involve interaction with on-line materials and with other people. But use of on-line materials is not a sufficient characteristic to define networked learning” (McConnell, D., Hodgson, V., & Dirckinck-Holmfeld, L., 2012). It has previously been proposed that NL is social networking and social knowledge construction made possible through information and communication technologies. This description might indicate why NL has previously been proposed being combined with Problem-Based Learning (PBL) as both are pedagogy and philosophy largely influenced by the traditions of open learning and other radical pedagogies and humanistic educational ideas. (Dirckinck-Holmfeld,2016)

Problem-Based Learning is a constructivist, student-centered, and problem-based approach (Barrows, 1985; Barrows, 1986) (Savery & Duffy, 1995) used at the medical education at AAU. The basic idea of PBL as an instructional approach is to have small tutor-guided groups solve a problem (Zumbach & Prescher, 2023). Several researchers have pointed out that PBL is a successful platform for developing collaborative competencies (Boelt et al., 2022) (Wood, 2003). During COVID DPBL methods were fast implemented both at AAU and widely in the educational landscape (Lyngdorf et al., 2021). Even before that digital components of PBL were increasingly being delivered using digital technology. Digital PBL may include learning software and digital learning objects, as well as listening to podcasts, web-conferencing tools, and digital games. According to a recent systematic review DPBL may be more effective in supporting specific knowledge and skills learning compared to traditional PBL and traditional learning. Some of the benefits of supplementing education with DPBL include increased learning effectiveness and flexibility for students in curriculum design. (Tudor Car et al., 2019) In conclusion DPBL opens new possibilities for collaborations across different platforms and holds a potential to improve learning. This highlights a potential that has not yet been met, and it has yet to be released through systematic efforts to understand the possibilities in the context of medical education.

The curriculum at the medical education at AAU is centered around the seven roles of physicians (Sundhedsstyrelsen, 2013). The roles describe the competencies necessary for providing the highest quality care (Frank, 2005), and are divided into the following: Medical expert, Communicator, Collaborator, Leader/administrator, Health advocate, Scholar, and Professional. These roles were originally described in the Canadian framework, CanMEDS (Frank JR, 2015; Frank, 2005). The central role in the framework is the Medical expert but as healthcare systems become increasingly complex, interconnected, and reliant on interdisciplinary teamwork (Broome, 2007), the Collaborator role has gained prominence. Physicians are expected not only to excel in clinical expertise but also to collaborate effectively with other healthcare professionals, patients, and families to achieve optimal patient care outcomes (Fewster-Thuente & Velsor-Friedrich, 2008). The definition of the Collaborative role is “As collaborators, physicians effectively work within a healthcare team to achieve optimal patient care”.

The specific focus on collaboration is a good example of alignment between PBL-, NL pedagogy and the CanMEDS framework, and could be important to further exploration using DPBL.

Therefore this study will be initiated to investigate the possibilities of DPBL within the framework of the medical education at AAU by exploring, and testing digitally supported pedagogical design options for facilitating the acquisition of competencies defined by CanMEDS framework.

The research question of the project is: “How can the use of NL and PBL pedagogy combined as DPBL methods facilitate the acquisition of the competency the Collaborator, as defined by CanMEDS framework in a medical curriculum?”.

## Methodology

To investigate “how the use of NL and PBL pedagogy combined as DPBL methods can facilitate the acquisition of the competency the Collaborator, as defined by CanMEDS framework in a medical curriculum”, an explorative sequential mixed-method study is designed. It will combine qualitative and quantitative data using established research frameworks. A scoping review will be initialized to scope out student perspectives on DPBL during medical education. Together with a qualitative focus group interview on the same topic, this contextualized knowledge will inform the development of a new teaching intervention aimed at enhancing the Collaborator role. The teaching intervention will be evaluated using quantitative measures of student engagement, time requirements, satisfaction and self-report learning outcomes. The data will be merged with focus group interviews to gain an in-depth understanding of the quantitative results and help understand the student perspective. The following methodological sections will focus on the teaching intervention.

### Methodological approach for developing the teaching intervention:

The project will be reported to the Internal Ethics Committee at AAU during spring 2024. Oral and written informed consent will be obtained from all participating students. Likewise the project will follow the regulations by the Danish Data Protection Agency.

The theoretical background of the teaching intervention will be NL and PBL, including constructivism. Constructivism is a philosophical view on how we come to understand or know. (Lebow, 1993) It has certain values aligned with NL and PBL. Those values are: Collaboration, personal autonomy, generativity, reflectivity, active engagement, personal relevance and pluralism.

The specific method to be employed to designing the teaching intervention will be the Activity-Centred Analysis and Design (ACAD) model. It is a meta-theoretical framework for understanding and improving local, complex, learning situations. ACAD can also be distinguished from design approaches that are teacher- or instructor-centred, content-centred or technology-centred. (Goodyear, Peter et al., 2021) This is interpreted as being a relevant match for the NL, PBL and constructivist theoretical background of this project.

The model comprises of an ACAD view on the architecture of design-time and learn-time where the students' activity is central and therefore placed in the center of the model. A tripartite approach is used arguing that students' activity is epistemically, physically and socially situated and the intended learning outcomes are described as including specific, proximal, general and distal outcomes. (Goodyear, Peter et al., 2021)

### **Context for the new learning intervention to be tested:**

The new teaching intervention will be applied to the current curriculum at the PBL introductory course on 1. Semester, Medicine. Approximately 80 medical students will work in 10 study groups consisting of 8 students in each group.

### **The new teaching intervention:**

In this study the DPBL component include both the specific digital element in the form of the podcast media and a certain pedagogical practice. In alignment with the most valuable implications of NL pointed out by NL practitioners, especially the aspects in focus in this study will be: 1) cooperation and collaboration in the learning process, 2) working in groups and in communities, 3) discussion and dialogue, 4) self-determination in the learning process and 5) the role technology plays in connecting and mediating (Hodgson et al., 2012).

The medical students will be asked to produce a podcast (with a length of maximum 15 minutes) in groups which by engagement in the active learning process will hopefully facilitate their collaborative competencies in alignment with the CanMEDS framework. This means that the podcast is an object of collaboration and hereby emphasizes the active learning process of the students.

The podcast will include theoretical content related to the specific content of the learning objectives, where students audibly present theories and tools for managing collaboration, knowledge sharing, and learning. Additionally, in the process of producing the podcast, students would necessarily collaborate at a higher taxonomic level to achieve the learning outcome by engaging actively in the learning process. A revision of Blooms Taxonomy has been created to account for new behaviors, actions and learning opportunities emerging as technology advances. It is called "Bloom's Revised Digital Taxonomy". Creating a podcast is placed at the highest taxonomy level meaning that this is considered a higher order skill. (Moore, 2022)

### **Evaluation of the teaching intervention:**

Student engagement, time requirements, satisfaction, self-report learning outcomes and beliefs around its efficacy in increasing their collaborative competencies will be part of the quantitative assessment. The qualitative approach will include semi-structured focus group interviews with the students. The qualitative and quantitative methods will be merged and interpreted to answer the aim and objectives of the study.

## **Preliminary findings**

At the International Conference on Network Learning 2024, the study design, as well as the aim and objectives of the study will be presented. At the time of the conference the user needs and perspectives has been performed, and the results of this will be presented, and interpreted as part of the design and frame of the podcast intervention. The intervention itself will take place in autumn 2024.

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