108
Building Interdisciplinary Collaboration Skills through a Digital Building Project

D. Gnaur[1]
Assistant Professor
University of Aalborg, Department of Learning and Philosophy
Aalborg, Denmark
dg@learning.aau.dk

K. Svidt
Associate Professor
University of Aalborg, Department of Civil Engineering
Aalborg, Denmark
ks@civil.aau.dk

M. K. Thygesen
Research Assistant
University of Aalborg, Department of Civil Engineering
Aalborg, Denmark
mkt@civil.aau.dk

Conference Topic: Engineering Education Research
Keywords: interdisciplinarity, collaboration, problem and project based learning

The purpose of this paper is to delineate core features of successful cross-disciplinary collaboration, and to consider how to bring these features into engineering education so that engineering students are better equipped for future interdisciplinary work. Despite a consistent interest in interdisciplinarity in education in the last decades, there are still conceptual inconsistencies and confusion surrounding the term. It is the integrative aspect, which is at the heart of interdisciplinarity, denoting the synergetic interaction between specific disciplinary perspectives. However, current university structures inhibit the integration of multiple disciplinary perspectives into a more comprehensive approach to problem solving. Meanwhile, the industry is increasingly in demand of graduates with strong interdisciplinary skills.

The present paper is guided by the following research question: What are the implications of interdisciplinarity for engineering education, and how would an enhanced interdisciplinary thinking influence curriculum planning? The present study points at the development of cross-disciplinary collaboration skills in real-life settings as instrumental to building interdisciplinary competence.

The various forms of problem and project based learning practices employed in many engineering educational settings may include an interdisciplinary dimension, which is though often challenged by current university structures and traditional disciplinary boundaries. Consequently, collaboration is limited

[1] D. Gnaur, dg@learning.aau.dk

to working in homogeneous groups on mutually agreed projects, with little scope for developing cross-disciplinary collaborative skills, i.e. the ability to negotiate conflicts, integrate expertise from related fields, and produce flexible, innovative solutions - all of which qualify students to work in the type of independent, interdisciplinary project teams, increasingly in demand by industry. Our aim is to raise awareness of this gap and suggest a framework for integrating interdisciplinary collaboration competencies into existing problem and project based learning curricula.

The data in this paper originates from the setting of an annually recurring, three-day-long digital building workshop, "Digital Days" (henceforth DD), that brings together industry specialists, university and vocational training staff, as well as exponents of the entire range of professionals populating a building site. Students and trainees engage collaboratively on a common digitalized design platform, the Building Information Modeling (BIM) method. BIM design tools allow for extracting different though automatically consistent views from a building model for various uses enhancing the integration of the design process. Being the meeting point, building models facilitate the coordination and collaboration between parties. BIM alters the cross-disciplinary approach used in the industry today, since it is only possible if the processes are iterative, and disciplinary contributions are continuously being merged into the project. BIM both requires and supports interdisciplinary collaboration and it is therefore suggested as a means to include interdisciplinarity in engineering programs.

One of the salient features in our findings was the aspect of collaboration between participants from the various disciplines, who not only benefited from working in a team, but also from the process of negotiating solutions with concurrent teams. Participants mobilized communicative skills in order to uncover each other's "ways of thinking and practicing" and the underlying principles of specific disciplinary methods in order to distill the problem solving approach. Moreover, the students gained more confidence in approaching problems.

The experimental learning climate boosted participants' spirit of inquiry and freedom to advance viable solutions to the open-ended problem. The dynamic social milieu promoted mutual commitment and motivation to comply with the constraints of a product oriented approach, where interdisciplinary collaboration was instrumental to project work.

Regarding the interdisciplinary objective in problem and project-based learning models employed in engineering education, our findings suggest that there may be further scope for interdisciplinary collaboration, at both intra-departmental and faculty level, and the wider social context including the industry. Socially facilitated learning environments created by real-life problem scenarios and the coexistence of diverse disciplinary perspectives are seen as main qualifiers for students engaging actively in interdisciplinary project teams.

In order to promote the development of interdisciplinary collaboration skills among engineering students, the interdisciplinary competence has to be explicitly acknowledged as a learning goal in the educational program. Besides the formal, curriculum level, a framework for integrating the development of interdisciplinary competence in engineering education should involve the organizational and instructional levels, i.e. explicit ways of organizing interdisciplinary learning opportunities, as well as the competence development level, i.e. equipping staff with the required insight and tools to facilitate students' learning processes. ■