



The Wisdom of the Educational Crowd: Teacher and Learner Sourcing Pedagogical Knowledge to Support Personalized Instruction in Blended Learning Environments

Thesis for the Degree of

PHD

By

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Submitted to the Scientific Council of the

Weizmann Institute of Science

Rehovot, Israel

Year

2024

Abstract

My research centers on studying the ways in which semantic information assists teachers in searching & selecting personalized learning materials in open educational resources (OERs) repositories, on using the collective wisdom of teachers and learners for collecting such information, and on the effect of participating in these processes on teachers' reflective thinking. By semantic information I refer to meta-data containing information about the types of knowledge covered by the learning resources (LRs), opinions and feedback referring to the LR's suitability for various pedagogical scenarios, and to evaluative meta-data describing their quality. The main goal is to enhance our understanding of how to build personalized learning environments that assist teachers in adjusting their instruction according to their own pedagogical preferences and the individual needs of their students. The research focused on crowdsourcing (i.e., gathering the information from teachers and learners) semantic and evaluative information about LR, and especially on mechanisms that will enhance teachers' motivation to contribute meta-data about LR, such as social recognition.

Most of the research was conducted in PeTeL (Personalized Teaching and Learning) – a blended learning environment developed within the Department of Science Education in the Weizmann Institute of Science. PeTeL contains both a shared repository of OERs and a social network module that enables teachers to follow each other and share learning materials and sequences with their peers. The research population consisted of science teachers represented by physics, chemistry and biology teachers who are active users of PeTeL (~1000 teachers). In addition, I worked with a group of 25 teachers who took part in different stages of the research: interviews, workshops and surveys. 15 of these teachers also took part in a Participatory Design process through a yearly teacher-training program. In this research I employed a mixed method

approach: on the qualitative side, I conducted interviews, surveys, questionnaires and a participatory design process with teachers. On the quantitative side, I employed data mining techniques, including log file analysis and social network analysis.

The research consisted of several stages: first, I examined teachers' search strategies in PeTeL's OER repository to better understand the types of information about LRs that assist them in their search. Second, I studied the feasibility of producing such information by crowdsourcing it from teachers and learners, and by automatically tagging LRs with semantic information using machine learning algorithms. In the third stage of the research, I explored the possibility of enhancing teachers' willingness to participate in crowdsourcing activities, especially in providing other teachers with recommendations about LRs, by using a socially-based mechanism. This was achieved by implementing a recommendation panel into PeTeL that provides the recommending teachers with social recognition. In the fourth stage, I examined teachers' use of social recommendations when searching & selecting LRs. In the fifth stage, I studied the relations between the strength of social ties in two teacher communities (physics teachers and chemistry teachers) and the effectiveness of the socially-based mechanisms. In the final stage, I examined whether the act of providing evaluative feedback about LRs fosters teachers' reflective thinking.

The results of my research demonstrate the importance teachers ascribe to social recommendations, the feasibility of enhancing teachers' motivation to contribute such recommendations using socially-based mechanisms, and the relations between the strength of community ties within a teacher community and the effectiveness of socially-based mechanisms. In addition, I found strong evidence of reflective thinking in teachers' recommendations about LRs, suggesting that providing such recommendations may indeed invoke reflective processes.

My work contributes to a better understanding of how teachers search & select learning resources, of ways to support their search strategies through

design, and how to develop wisdom-of-the crowd mechanisms for collecting information to support them. Such mechanisms need to balance between the amount and quality of the information being collected, teachers' incentive to provide it, and fostering reflective thinking among teachers.