PROJECT ABSTRACT: We are using HP mobile technology to promote the introduction of PBL in a course on Algorithms and Computer Programming. Issues related to the efficiency of PBL in this discipline are dealt with by using tablet PC software to assist students and tutors as they go through the steps of the PBL method. The goal is to enhance the ability of students to apply learned concepts in real problem-solving without compromising coverage of the course syllabus.

Impact on Student Learning

Learning computer programming is a major challenge for first-year Computer Science undergraduates. Algorithmic reasoning is typically not part of the background they bring from secondary school. As a result, many of our students struggled to get a sufficient grasp of the taught concepts and their application in real problem-solving scenarios. As a further consequence, significant drop-out and failure rates were also common.

With the use of PBL\(^1,2\) and tablet PCs, we expect to engage students in a more effective way in classroom activities. Past research has shown a promising impact as students get more participative and develop deeper understanding of concepts\(^3,4\). We aim to complement such research by showing the impact of tablet PC technology to facilitate and enhance the task of learning with PBL. We will measure the impact on student performance, both quantitatively and qualitatively, also identifying the respective contributions of PBL and tablet PCs toward the achieved results.

Impact on Teaching

Currently, the course is taught as a series of traditional lectures and practical lab sessions. As part of this project, we are redesigning the whole classroom experience toward a more interactive, collaborative, and group-based model. In the beginning of the semester, the class is split into groups of 5-7 students. The course syllabus is presented as a series of open-ended problems that convey the concepts to be taught using PBL methodology. The teacher assumes the role of a tutor, guiding students through the learning process and providing mini-lectures when needed. Importantly, collaboration among students and student–teacher interaction are augmented by ink-based tools and by the mobility features of the tablet PC.

We plan to quantify the impact on teaching in terms of, e.g., coverage of the course syllabus, efficiency of lecture preparation, and the ability to reuse course material.

Technology Implementation

The ink-based capabilities of tablet PCs will be exploited as a natural means to interact with the computer. A number of tablet-based collaboration tools will be used in the classroom, such as Classroom Presenter\(^5\), Ubiquitous Presenter\(^6\), Group Scribles\(^7\) and Jarnal\(^8\). We also plan to develop a set of ink-based tools for PBL-style collaboration and programming: a shared virtual whiteboard and a sketch-based graphic tool for program design and simulation. Finally, extensions to existing software will be developed, such as a feature to facilitate the discovery and access to course-related resources from inside Classroom Presenter.

We also plan to explore the use of tablet-based mobile computing tools to facilitate monitoring and evaluation of student work.

References