Supporting and enhancing teaching and learning with mobile devices

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Abstract:

This paper describes a set of classroom applications designed for real-time interaction between lecturers and students using mobile devices. The system is designed to provide lecturers with an instant feedback on how well students are following lectures and in what amount they are interested in the subject presented. Pedagogical principles which are foundations of the system and which place the system in the current landscape of technology-enhanced learning and teaching are demonstrated. Finally, benefits of the approach established here and plans for future work are presented.

1   Introduction

Although using computers and other electronic devices in education is not a new concept, involving mobile devices into an everyday classroom setting is something relatively innovative [1]. This idea is strongly supporting new and emerging mobile learning paradigms [1, 10, 11]. Mobility, new forms of educational dynamics and opportunities for collaborative interaction and student feedback remain to be explored and utilised.

We believe that using PDAs in a classroom can help provide a highly interactive learning environment and, what is more, enhance the classroom. Our system is designed to be utilized in a real-life classroom setting where every student is equipped with a PDA and uses it to signalize his or her level of interest and understanding of the material presented. The lecturer is also equipped with a PDA with a functionally designed interface that displays aggregated student - related statistics in real-time.

2   Pedagogical background

To achieve a good pedagogical design, the theory of learning [2,4] must undoubtedly be adopted. As most e-learning systems in modern higher and further education do [2], this system includes blended elements that emphasise all three broad theoretic learning perspectives: associationist/empiricist/behaviourist, cognitive and situative perspective.

2.1   Learning perspectives from which design principles were derived

The associationist/empiricist/behaviourist approach emphasises learning as an activity and analyses its outcomes [3]. In the system presented here, this approach is accepted: as soon as students complete their on-line tests, immediate feedback on their success is received. Teachers and students involved in the teaching and learning process in the classroom are

immediately notified with the results of the test which clearly depicts students' current position it the knowledge space [4,5].

The cognitive approach regards learning as achieving understanding and emphasises interactive environment for construction of understanding, as well as conceptual development [2]. This approach is enticed throughout the system as well, since students are encouraged to anonymously signal their level of understanding of the matter presented. Therefore, the teacher is free to adjust the presentation to facilitate understanding of the material presented.

The situative approach regards learning as a social practice and aggregates at the level of groups of students. It focuses on how the knowledge is distributed socially, and emphasises a dialogue that facilitates the development of learning relationships and environments of participation in social practices of enquiry and learning [2,7]. Elements that emphasise the situative perspective in the system can be seen through the continuous interaction between the students and the lecturer. This interaction would hardly be achieved without using mobile devices, especially with a large number of students in a classroom.

3   The system in practice

To get a deeper insight into the students' interest or level of understanding, the lecturer can set out a survey or an exam with a push of a button. As soon as the lecturer starts a survey or an exam, students' mobile device interface displays a list of possible answers to the survey (Figure 1) or an exam question to be answered. When the exam or the survey ends, summary results are displayed on the lecturer's PDA giving a better insight into students' understanding (Figure 2) and knowledge of the subject presented.
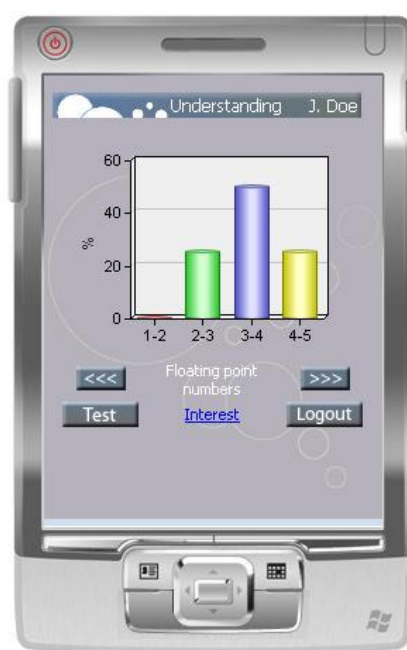

Figure 1.

Figure 2.

4   System's influence and benefits

Many studies have shown that students' active participation and involvement, as opposed to just listening to the teacher in a passive mode, helps to improve students' satisfaction and

productivity, and thereby facilitates the learning process in whole [8]. Using the system presented, students would not only be able to express their understanding (or lack of it) and content (or discontent), but they would also be able to do so instantly, without the fear of exposing a lack of understanding or indifference, since the individual expression can be concealed by a large number of votes.

Benefits of using the system presented are numerous. It is designed to gather a large amount of heterogeneous data, perform real-time statistical analysis and provide instant feedback to the lecturer. The data collected can also be used in later analysis to derive numerous valuable information regarding the environment and students, such as every student's personal profile, interaction patterns and aggregated student statistics. The aim is to achieve a more effective and a student - friendlier learning environment through a set of guidelines on how to design better presentations and adjust educational content to better fit the needs of particular student or groups of students.

5   Future plans

Future plans include the following:
- mobile collaborative learning support
- ad hoc groups of students creation
- location awareness in a mobile learning environment
- advanced visualization of a modern location-aware learning environment
- exploring interaction patterns
- dealing with aggregated student statistics
- putting together student's personal profile

6   Conclusion

The article describes a system based on mobile devices, designed to entice students' active participation and involvement in a class. This system, compared to listening to the teacher in a passive mode, can improve the quality of the learning process in whole and improve students' satisfaction and productivity.

By completing ad hoc tests and surveys, students provide valuable data used to produce summary information on their content and understanding of the matter presented. Since this is done anonymously, the students' level of understanding and knowledge can be established more objectively.

We believe that using this system in an every day classroom settings can provide a way to inspire, motivate and encourage even the most unenthusiastic students, to stimulate exciting ideas, and to entice the thrill of teaching.

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