Chapter 1
Mobile Exam System – MES: Architecture for Database Management System

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ABSTRACT
As the mobile applications are constantly facing a rapid development in the recent years especially in the academic environment such as student response system (López, Royo, Laborde, & Calvoa, 2009; Ngai & Gunasekaran, 2007; Mary & Biju, 2008; Nayak & Erinjeri, 2008; Roth, Ivanchenko, & Record, 2008; Lu, Stav, & Pein, 2009; Lu, 2009; Turning Technologies, 2010) used in universities and other educational institutions; However, an effective and scalable Database Management System to support fast and reliable data storage and retrieval is missing. This paper presents Database Management Architecture for an Innovative Evaluation System based on Mobile Learning Applications. The need for a relatively stable, independent, and extensible data model for faster data storage and retrieval is analyzed and investigated. Finally a case study to prove the concept of the urgent need for the system is proposed. It concludes that the system is important by emphasizing further investigation to support multimedia data types, such as video clips, images and documents in near future.

MOBILE EXAM SYSTEM - MES

Ever since Mobile Technologies emerged in 1980s, enormous amount of development has been made and improvements are constantly evolving everyday that almost any given Internet applica-

DOI: 10.4018/978-1-4666-0936-5.ch001
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work station (Jonsson, Nass, & Lee, 2004). Currently the academic bodies are making good use of mobile applications for e.g., student response system (López, Royoa, Labordab, & Calvoa, 2009; Ngai & Gunasekaran, 2007; Mary & Biju, 2008; Nayak & Erinjeri, 2008; Roth, Ivanchenko, & Record, 2008; Lu, Stav, & Pain, 2009; Lu, 2009; Turning Technologies, 2010) particularly mobile based response system which can be evolved to support a large number of concurrent users to access resources (Amailef & Lu, 2008).

Mobile technology is dramatically shaping the nature of teaching, learning and social interaction. Students and teachers may integrate technology and learning both in and out of the classroom, due to portability of mobile devices and their ability to connect to Internet almost anywhere. Is it possible to improve students’ learning by organizing the teaching process in different methods that are more time effective and efficient, for instance, by using modern hand held mobile computing solutions in learning processes? Student Response Systems (SRS) seems to be a promising technology in the recent days. Successful initiatives have recently been reported from UK. Mazur (1997) outlined effective use of SRS in peer instruction in 1997. Main research findings in the area of clicker based response technology, point out to us that attributes like i) feedback on learning (Rice, 2006), ii) increased involvement (Rice, 2006), and iii) more discussions and peer-learning (Masikunas et al., 2006; Bates et al., 2006) are commonly appreciated by the students.

Students may indeed soon answer tests by using a mobile device like their own Smartphone. Could such tests be designed to enhance learning by utilizing interactive learning methods? The European Commission has recently funded a KA3-ICT project that is going to use Smartphones to turn results of tests into a creative learning process. The project are going to develop a new evaluation model where test results for a class are turned into an active, creative and collaborative learning process by the use of immediate feedback:

- **Verification feedback led by a teacher:** why is this particular answer correct and why are the others incorrect.
- **An elaborate feedback discussion run by students:** the answers are displayed but they don’t know which the (in) correct ones are.
- **An elaborative feedback discussion led by one student:** the deviation from the correct answer without addressing why this is correct and the other ones are incorrect.

This objective of this investigation is to propose a suitable architecture for database management to support ‘Innovative Evaluation System in mobile learning.

**BACKGROUND**

A student evaluation system that utilize Smart phones must give the teacher a new tool, allowing him/her to either give verification or elaborative feedback to individual students or groups of students immediately after a test. This is a key factor helping students to improve their skills by the use of active collaborative supported learning. Students will, when they still remember the questions in the test, learn why the correct answer is correct and why the other ones are incorrect. Thus, mobile technology provides new evaluation and testing criteria for education and training.

According to contemporary models of learning, individuals understand and remember new material best, when they elaborate on that material in some manner (Pressley et al., 1992) for inclusion of elaborative interrogation, and (Wittrock, 1990) for new models of Informative Technology [IT] generative learning. Elaboration can take the form of adding details to the information, clarifying an idea, explaining the relationship between two or more of the new concepts, making inferences, visualizing an image of some aspect of the material, applying an analogy relating the
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