Preface

OVERVIEW

Mobile learning is overwhelming. It is a new trend in pedagogical communities. In particular, the recent use of smart devices or Smartphone technologies makes even popular than ever. Its learning is flexible, dynamic, portable and ubiquitous, i.e., it can be used at anytime and anywhere. Recent years, a number of universities around the world have launched their initiatives in the subject area using commercial or non-commercial systems, such as TurningPoint, Audience Response Systems (http://www.turningtechnologies.com/), Clicker in USA (http://grok.lsu.edu/Article.aspx?articleid=10619), Qwizdom (http://www.qwizdom.com/), or Student Response System in UK, Europe (http://xdir.hud.ac.uk/srs/, http://scom.hud.ac.uk/scomzl/joan-research/SRS-pub.htm, http://histproject.no/node/18), in their teaching and learning practice. These initiatives bring a huge challenge to the traditional learning activities, i.e., from paper – pencil based learning, chalk – overhead presentations, and indoor classroom based towards thinking – response with click, press or touch actions, distance learning with wireless communications. It follows that mobile learning is an arising methodology in pedagogical domain, particularly equipped with emerging technology in mobile computing.

With emerging technologies so called Smartphone, the facilities, features and functionalities, which are provided by the devices, are greatly enjoyed by the users around the world. Video/audio, touch screen, multimedia contents, and even navigations, particularly useful for the activities beyond classrooms, are easily adopted into the process of learning teaching. They are so popular to different learning groups no matter which level or what ages. Particular impact is on the users from new generation.

Mobile learning provides a better practice in student engagement. Students can use devices to response their understanding instantly. For example, Student Response System, which is a piece of simple, friendly and easy to play software, with a simple click/press/touch, students can voice their opinions to agree or disagree about their services provided by the trainers; students can decide what output they want to select; students can explore their maximum potential for their achievements. It follows that mobile learning is a typical case of technology enhanced learning.

Mobile learning matches the speed of fast moving methodologies in pedagogical world. The theories of activity based learning, problem based learning, work based learning, and opinion based learning, learner centered learning, etc. can be integrated with these tiny handheld devices. Students and teachers communicate effectively and efficiently with these simple clicks to obtain the formative/informative and summative feedbacks. The learning outcomes for both ability and knowledge can be smartly measured and observed through the latest ICT technologies.

Mobile learning is also challenging in both pedagogy and computing science, because of some limitations existent, such as wireless communication problems, bandwidth problems, Network problems, accessibilities, efficiency, screen size, data management, user interfaces, simplicity, security, cost, expertise for this special area, and required functionalities by special subjects. The issues in technical functionalities, user-abilities, popularities and obstacles of mobile learning in real situations have been discussed within chapters of this book. Although all the problems may not be covered, the need of further research in near future is clearly indicated.

THE TARGET AUDIENCE

Immediate audiences for this book are from the area of mobile learning communities around world. The book targets at the readers of learner/trainers in educational institutes, industrial training association, commercial or non-commercial teaching and learning institutes. Researchers in psychology, education and social science can be also benefited from the book. Professors, lectures and teachers from a wide range of subject areas can be benefited from the book if they are interested in mobile learning. The book can be an inspiration for research initiatives, and reading materials for educationists and students, and a library collection for this fast developing subject area with emerging cutting age technologies.

THE IMPORTANCE OF EACH OF THE CHAPTER

This book is organized in 14 chapters with different topics in the subject area. The importance of each chapter will be introduced as follows.

Chapter 1 is to introduce architecture for Database Management System for a mobile exam system. Mobile exam system is a new concept in mobile learning area. However, an effective and scalable Database Management System to support fast and reliable data storage and retrieval is missing. This chapter 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 proposed. It concludes that by emphasizing further investigation the system is important for high throughput so as to support different data types, such as video/image and documents.

Chapter 2 presents a mobile learning content system using the latest mobile technologies and concepts to promote the communications between learners and teachers. The solution demonstrates that multimedia contents can be interactively and collaboratively used in engineering classes through the mobile devices. The system called, CiVUS – Content-independent Versatile Ubiquitous System, may offer users a flexible learning style inside or outside classroom, according to the advantages of mobile devices. It also addresses that the system has been tested in the real world. For example, the study group collected answers from users in the Universities in Portugal and Spain.

Chapter 3 discusses a special technique, XML compression. The importance of this chapter is to introduce a way to deal with large amount of XML documents generated by institutes when they are doing mobile assessments or collecting responses from the learners. XML has becoming the standard way for representing and transforming data over the World Wide Web. Moreover, these documents becoming the way to represent the object used in Mobile-learning technology. The problem with XML documents is

that they have a very high ratio of redundancy, which makes these documents demanding large storage capacity and high network band-width for transmission. These documents need to be decompressed and being used without or with minimum decompression. This chapter presents the complete testing process for the XML compressing and Querying System (XCVQ) that has the ability to compress the XML documents and retrieve the required information according to all kinds of queries.

Chapter 4 investigates designing and developing a Student Response System for Mobile Internet Devices. This chapter presents a Student Response System for modern Internet-capable mobile devices, which was developed in a European R&D project, co-funded by the European Commission. Their goal was to make a system that is designed for speed, ease of use and flexibility for use in lectures. Researcher have tried to make a time efficient and intuitive system that does not compromise flexibility and that enables the teacher to use any lecture format he/she sees fit. The only requirement is a computer with an Internet connection; the teacher is not bound to specific presentation software. The system is web-based, enabling students to use their own mobile device or computer. The cost for both educational institutions and students is kept at a minimum, lowering the threshold for using the system in education. As of today, the program is free of charge and can be found at histproject.no.

Chapter 5 presents a middleware for distributing XML data between mobile application servers. This research seeks to introduce architecture of new approach of distributing XML data files between different mobile application servers. The importance of this study is to set a multi-level of security defense for interchanging XML data files between different servers. The main objective and goal of this study is to transmit XML data files between different Mobile Application Server (MAS) using internet cloud infrastructure in a secured manner coupled with reliability and quality of communication. Taking into consideration that the system architecture attribute is to be independent, scalable and flexible of using cloud computing. Furthermore, this architecture designed to minimize the risk of any alteration, data loss, data abuse, data misuse of XML critical business data information. As cloud computing, using existing cloud network infrastructure to get advantage of the scalability, operational efficiency, and control of data flow are big consideration in this architecture. A test has been made to measure the performance of the Real-time Interactive Data Exchange system (RIDX), one by using standard TCP protocol, and one by using RIDX UDP protocol. As a result, starting from 4 nodes up to 10 nodes in the cloud, RIDX architecture performance showed good results, conversely the study showed that using RIDX UDP protocol as a transport protocol gives better performance than standard TCP, moreover, using RIDX UDP transport protocol assures the reliability and lossless of data transmission to all nodes, therefore, RIDX acts as a reliable multicast transmission.

Chapter 6 presents methodological experiences and evaluation results obtained during introduction and testing of a new online student response system (SRS) for modern mobile devices at Sør-Trøndelag University College, in Norway. The aim of the test period was methodological development, based on student evaluation. Using in-depth interviews with students, researchers' awareness of how SRS was comprehended by the students in their learning process increased. Researchers were faced with several methodological choices and practical challenges when introducing SRS. The procedures and methodological choices were based on published experience and their own assumptions. However, what researcher believed to be important pedagogical, were among the students perceived as positive but not in the way researchers expected. The students have a clear perspective on their own learning process and gave us an insight into how SRS fit into their own learning process. Students' perceptions regarding methodology, in combination with their own experience of learning, appear as a necessary ingredient for an appropriate implementation and use of SRS in teaching.

Chapter 7 reports examples from new, on-going distance learning activities in Romania that utilize state of the art digital media, tools and methods. Examples include state of the art video tools, design of video infrastructure and training courses employed for classroom modernisation, to address technological and pedagogical innovations in vocational education and training. The objective is to renovate the teaching infrastructure used by specialists in vocational education, and improve vocational training quality by providing more flexible trainings paths to the Romanian labor market. The later includes dissemination of a new model for organizing and delivering professional vocational training comprising of competence transfer, competence export, building networks, and development of contacts with vocational schools within a regional development perspective. The training delivery utilizes state of the art ICT solutions, high definition video services, and blended learning frameworks.

Chapter 8 introduces a multilingual Student Response System (SRS) that is designed to handle anonymously on-the-fly questions for local and distance lectures between teachers and students and is deemed necessary to be utilized in Europe after being tested in classroom for over two years. SRS consists of two friendly and interactive interfaces: a control interface (SRS-CI) on the teacher side and a response interface (SRS-RI) on the student side. The technologies in Flex builder and JavaServer Pages (JSP) are applied to develop multilingual support for SRS-CI and SRS-RI, respectively, based on the method of resource bundles. The localization design and implementation of SRS are carried out in this research as a case study to illustrate and investigate the Flex and JSP-based localization issues for response system. This chapter performs linguistic testing against the functionalities provided in SRS, discusses the generated test results and highlights the problems in localization and cross-culture design. Finally, multilingual SRS could make an additional contribution to pedagogical communities to engage trainers and learners whose native languages are other European languages.

Chapter 9 reports an investigation into environmental education through Envkids didactical framework and ICT tools. Global awareness on the need to change everyday behavior towards some more environmentally friendly practices has been on the rise over the last few years in the face of emerging phenomena such as global temperature rising, desertification, extreme weather, sea water level rising, and the potential resulting disruption to everyday life for large populations. Even if in most European countries a certain amount of environmental objectives for primary education are defined, teachers in the field feel a substantial lack of supporting implementation guidelines, especially for digital deployment in the classroom. Addressing this need, the work presented in this paper aims at the development of blended learning activities that deploy an explorative and collaborative didactical framework towards environmental sustainability training for primary education through a combination of in-class instruction, virtual experimentation, storytelling practices, and on-line collaboration. The validation activities carried out so far demonstrate a positive teacher and learner reaction and an easy integration of the methodologies and demonstrators into existing school practices.

Chapter 10 presents a research into development of an extended information quality framework for E-Learning System Content for engineering education courses (EECs). Poor integration of pedagogical and technological learning elements within teaching and learning methodologies may have substantial impacts on the effectiveness of learning. Although educational institutions are improving their courses, teaching and learning methodologies and assessment strategies with tailored approaches, their efforts at improvement tend to focus narrowly on academic results. The authors believe that educational courses should give priority to educational goals and labor market expectations (industrial companies' requirements) in devising the methodology of teaching and learning. The technology based learning system has a capability to comply with diverse requirements as mentioned above. The purpose of this paper

is to develop an extended information quality framework to measure the effectiveness of e-learning content for technology based learning system for engineering education courses (EECs) in Technical and Vocational Education (TVE) in Bahrain. The model incorporates the requirements of educational goals (TVE goals) and modern industrial needs and integrates these with existing information quality frameworks. The extended model incorporates pedagogical and technological elements, is consistent with the educational objectives and industrial requirements, and can be used as guidelines for measuring the effectiveness of e-learning packages delivered in EECs.

Chapter 11 introduces a research into using an application of mobile and wireless technology in Arabic learning system. Mobile and Wireless technologies has been used in various areas, and it begins to have a huge impact on how education takes place in several disciplines. This technology has improved considerably, making mobile devices extraordinarily suitable and reasonable and M-Learning a reality. Wireless Response System (WRS) is a developed generation of Student Response System (SRS). It uses devices that enable students and trainers to provide definite responses to many questions during the lesson with an immediate feedback to the students about their level of knowledge and understanding. However teaching in Arabic language need some specific features which have been included in the existing WRS and the steps of implementing them are considered in this paper. The developed version of WRS seeks to increase the users' interactions and engagement through adding a new function to WRS which is Arabic language. Nevertheless, some universities and institutes in Arab world signed strategic corporations with mobile service providers to start this type of services for their education branches. This paper contains an analysis of ICT penetration and the level of m-learning environments in Arabic countries.

Chapter 12 discusses the possible reasons why classroom response systems are little used by teachers, the benefits of using such a system for teaching, and how their greater use could be promoted. The primary source of research was a series of personal interviews with University academic staff and students. Post Graduate Certificate in Education (PGCE) students commented both in their capacity as teachers using them in the classroom, and how they also used them as students. In addition data was collected from traditional undergraduate students. The research found that students enjoyed using classroom response systems and those who were typically a little shy were less inhibited to voice their opinions when they could contribute using a response system. The benefits to teachers were increased student engagement and the provision of a simple and quick means of student feedback which improves a teacher's awareness of their learners understanding and progress. PGCE students were found to be very keen to integrate a response system into the classroom when they started teaching, but established teachers were found to be more hesitant, due to their lack of awareness of the pedagogical benefits and the tutor's lack of understanding how to set up and use the system.

Chapter 13 presents an investigation into preliminary analysis of using game in problem based learning in Learning Mathematic. The growing awareness of mathematic competency in education and careers has been as an important agenda among parents and students nowadays. Thus, teaching mathematic effectively is a challenge to educators in schools and higher institution. The combination of Problem Based Learning method and game in mathematic environment can be synchronizing to help students mastering mathematic knowledge heuristically. The objective of this paper is to highlight the literature review and the preliminary analysis done in the early phase of the research of Using Game in Problem Based Learning in Learning Mathematic. The chapter also discusses on the research framework that is divided into 3 parts; control mode, development and testing.

Chapter 14 discusses a model using technique of RESTful (Representational State Transfer) web service to create an educational tool called Student response System – SRS. The SRS is an open online system and can be used by mobile devices. The importance of this system developed is improve student learning because the SRS provides a response system, accessible through mobile devices allowing students to submit virtually anonymous responses, i.e., other students are not able to see individual submissions. The system makes strong use of open and flexible standards to allow for external software to control the service with use-case specific interfaces.

It is aimed to support as many students using the service in parallel as possible. In this paper, the main performance bottleneck of the system is examined in detail. In order to provide an easy-to-use interface, the mobile devices of the students need to be notified by the service about real-time changes of the data. The benchmark results indicate a high user capacity of the service. It is also a robust approach able to recover quickly after an unusual high request peak.

CONCLUSION

In conclusion, this book presents a general picture for the latest concepts and the state of the art technology in mobile learning. In particular, it addresses that

1. Technology enhanced learning impacts pedagogical circles. The new methodology implemented can be greatly benefited from the support of rapid devolved technology.
2. Smartphone technology has a strong impact on next generation's learning patterns through their thinking, behaviour and activities. Teachers and learners can be communicated ubiquitously with a simple click and Wi-Fi connections. The new learning environment will be activated with new technologies and new learning theories.
3. New challenges in the research into assessment, evaluation, communication, achievements and student engagement in educational institutes.