Special Issue on Mobile Computing and Contextual Learning

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Mobile learning is to use mobile handheld devices, such as smartphones and tablet PC, for teaching and learning and contextual learning allowing students to learn by carrying out activities or solving problems in a way that has the tasks behave like the ones in the real world. Both of them are popular research and pragmatic subjects these days and are closely related to handheld computing because they normally involve the use of handheld devices. This special issue includes four outstanding articles selected from the 9th World Conference on Mobile and Contextual Learning (mLearn 2010) held in October 19-22, 2010, Malta and one related article from independent authors. The mLearn 2010 conference brought together the world's leading mobile learning researchers, developers, and activists in an environment that would stimulate sharing expertise and experience towards the growth of mobile learning accelerating enhanced innovation. The conference concentrated around *Open Education* in the future of mobile and contextual learning with increased accessibility for all users in terms of technologies, applications, and further developments. The mLearn 2010 was a huge success and received many high-quality papers. A brief introduction of each of the five articles is given next.

Article 1. "Context-Aware and Adaptive Units of Learning in mLearning": Most of the available learning contents have been designed for desktop computers, so accessing that information is limited by the technical capabilities of mobile devices. As a result, students might lose interest and motivation to learn using their mobile devices if content adaptation and learning personalization processes are not appropriately designed. This research presents a context-aware adaptation architecture for mobile learning. Two different kinds of architecture are proposed. One is based on conditional statements from the IMS Learning Design Specification and the other one is based

on a transcoding mechanism. Moreover, the learner's contextual information can be used to design the learning process and adapt to different activities and resources.

Article 2. "Design Guidelines for Location-Based and Contextual Learning Supported by Mobile Devices": A common problem of mobile learning is that students spend time focusing on the mobile devices at the expense of interacting with other students or exploring the physical environment. The authors approach this problem from an interaction design perspective, where they design and analyze geometry-learning activities in two iterations. They present six guidelines for designing location-based and contextual mobile learning activities, where mobile devices support rather than distract students from contents and contexts relevant to the learning goals. Finally, the guidelines are evaluated using a model of interaction, which represents mobile device interaction as one of four different modes of human interaction with technology.

Article 3. "An mLearning Journey: Mobile Web 2.0 Critical Success Factors": This research discusses six critical success factors for mobile Web 2.0 implementation identified throughout fifteen mobile-learning action research projects (cycles) carried out and evaluatedw between 2006 and 2009. The paper briefly outlines the implications of each of the five learning contexts involved in the projects in light of these critical success factors. The resultant developments of strategies for future mobile-learning projects in 2010 and beyond are also briefly discussed.

Article 4. "Advanced Mobile Lecture Viewing: Summarization and Two-Way Navigation": This paper proposes a fully automated recorded lecture summarization tool and an innovative mobile iPad visualization tool. Summarization works for blackboard-based lectures by robustly extracting blackboard edits with great accuracy and high performance. Analysis output is then presented with overview and visual timelines along the original video to allow discovering lecture passages based on time. Proposed summarization, temporal and spatial navigation along with interactive visual annotations aim

to bring to recorded lectures the benefits that other digital learning material has long enjoyed and finally entice the Generation Y of learners who demand finding and consuming information with an always greater flexibility.

Article 5. "A Study of Reusing Smartphones to Augment Elementary School Education": The evolution of smartphones is extremely fast. A smartphone could have few generations in just one year. To mitigate the impact of disposed devices, this research proposes a design for reuse model in which obsolete devices will be reused for a class of applications that can be satisfied with older, less reliable technology. Their experiments indicate that the resource requirements of educational applications can all be well satisfied by repurposed smartphones. The key challenge is the design of software that can adapt to extreme heterogeneity of devices. The authors also propose insights to aid establishing a sustainable model of designing mobile applications for phone reuse.

The themes of the mLearn 2010 conference were designed to appeal to a wide range of audiences who are interested in enhancing learning, designing content and developing systems for mobile devices and wireless networks. The selected five articles cover the most up-to-date, practical, innovative topics of mobile and contextual learning including (i) context-aware learning, (ii) location-based and contextual learning, (iii) mobile Web 2.0 success factors, (iv) mobile lecture viewing, and (v) smartphone reusing. We want to thank the reviewers and authors for their great help and contributions. Without them, the success of mLearn 2010 and this special issue would not be possible. Hope you will enjoy reading this special issue.

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Matthew Montebello is a senior lecturer at the Department of Intelligent Computer Systems at the Faculty of ICT, University of Malta. Currently he lectures and heads the Intelligent Systems Technology Group and his field of interest spans numerous areas concerning the application of Artificial Intelligence in games and virtual worlds. He is also involved in the proposal and coordination of local and EU funded projects within the educational, mobile, web, and ambient intelligence domains.

Vanessa Camilleri is currently reading for a Doctorate at the University of Malta. Her research interests are mainly in technology enhanced learning more specifically involving Virtual Worlds technologies, their impacts and effectiveness for teaching/learning, social networking for educa-tion and interaction processes within the pedagogical framework. Her Doctoral thesis which focuses mainly on the design of virtual worlds for learning effectiveness, provides an insight into frameworks of measure of effectiveness in teaching, an area which is as yet (at least for virtual worlds) in its infancy stage. She has in addition delivered a series of talks and presentations at international Conferences in relation to Mobile Learning applications and Serious Games, as well as Virtual Worlds and "Digital" Social Spaces.

Alexiei Dingli is a Senior Lecturer of Artificial Intelligence within the Faculty of ICT at the University of Malta. He is also one of the founder members of the ACM student chapter in Malta, of the Web Science Research, of the International Game Developers Association (IGDA) Malta and of the Gaming group at the same University. He pursued his PhD on the Semantic Web at the University of Sheffield in the UK under the supervision of Professor Yorick Wilks. While there, he worked on various large projects but his major contribution can be attributed to the Advanced Knowledge Technologies project, one of the largest Interdisciplinary Research Collaborations (IRC) funded by the Engineering and Physics Research Council (EPSRC). For this project he created two systems which were rated World Class by a panel of international experts whose chair was Professor James Handler (one of the creators of the Semantic Web). These systems were later used as a core component of the application that won the first Semantic Web challenge (2003). His recent work in Mobile Technology and Smart Cities (2011) was also awarded a first price by the European Space Agency. He has published several posters, papers, book chapters and a book in the area. For four years, he also worked as a Senior Manager in a large government corporation where he got insight into the needs, potential and deficiencies of digital natives. During this time, he also pursued an MBA with the Grenoble Business School in France specialising on Technology Management.

Wen-Chen Hu received a BE, an ME, an MS, and a PhD, all in Computer Science, from Tam-kang University, Taiwan, the National Central University, Taiwan, the University of Iowa, Iowa City, and the University of Florida, Gainesville, in 1984, 1986, 1993, and 1998, respectively. He is currently an associate professor in the Department of Computer Science of the University of North Dakota, Grand Forks. He was an assistant professor in the Department of Computer Science and Software Engineering at the Auburn University, Alabama, for years. He is the Editor-in-Chief of the International Journal of Handheld Computing Research *(IJHCR) and an associate editor of the* Journal of Information Technology Research *(JITR), and has acted as editors and editorial advisory/review board members for over 20 international journals/books and served more than 20 tracks/sessions and program committees for international conferences. He has also won a couple of awards of best papers, best reviewers, and community services. Dr. Hu has been teaching more than 10 years at the US universities and over 10 different computer/ IT-related courses, and advising more than 50 graduate students. He has published over 100 articles in refereed journals, conference proceedings, books, and encyclopedias, edited five books and proceedings, and solely authored a book titled* Internet-Enabled Handheld Devices, Computing, and Programming: Mobile Commerce and Personal Data Applications. *His current research interests include handheld computing, electronic and mobile commerce systems, Web technologies, and databases. He is a member of the IEEE Computer Society and ACM (Association for Computing Machinery).*