

# Preface

The exponential growth in handheld devices and wireless technology in recent years, and increasing availability of high bandwidth network infrastructures, have opened up new accessibility opportunities for education. As a result, ubiquitous learning environments have started to emerge with potential to support life-long learning. These environments break the boundaries of the classroom and enable learning to take place in the contexts where learners are able to relate with the learning scenarios in their own living and work environments, leading to better learning experience. This book focuses on the design and architecture of ubiquitous learning environments, associated technologies, various learning scenarios supported by these environments, and various contexts that arise in such environments where seamless immersion of formal and informal activities and interactions has potential to contribute to the learning process. With particular focus on adaptivity for individual learners, this book explores various dimensions of ubiquitous learning environments and technologies.

Kinshuk provides a possible roadmap for adaptive and personalized learning in ubiquitous environments and looks at the vision for advancements in research in future. Starting with various pertinent research issues, he looks at overall research direction and provides sample roadmap with examples and anecdotes.

Jon Dron and Terry Anderson first explain their typology of social forms, categorizing social groupings as sets, nets, and groups, along with an emergent entity, the collective, which arises from them. Then they describe the pedagogies, benefits, problems faced, and tools for learning using each social form, and after that they conclude with some suggestions about how social media may best be constructed to support each form and the likely future shape of social learning.

Vive Kumar, Kinshuk, Clayton Clemens, and Steven Harris discusses the core ideas of causality and modeling of causality in the context of educational research with big data analytics as the underlying data supply mechanism. Their chapter provides results from studies that illustrate the need for causal modeling and how learning analytics could enhance the accuracy of causal models.

Chris Lu, Maiga Chang, Kinshuk, Echo Huang, and Ching-Wen Chen reveal the design of a story generation engine for mobile educational role-playing game and

the use of decorating mobile learning activities with the generated story fragments. The results from an experiment show that the stories play an important role in terms of increasing student perceptions toward the mobile educational game's effectiveness and making students more satisfied with the game.

Tingwen Chang, Jeffrey Kurcz, Moushir M. EL-BISHOUTY, Kinshuk, and Sabine Graf introduce a general approach to automatically identify working memory capacity (WMC) from students' behaviour in a learning system which can provide teachers meaningful recommendations to support students with low and high WMC by the recommendation mechanism created by them.

Nian-Shing Chen, I-Chun Hung, and Wei-Chieh Fang introduce an augmentation-enhanced learning context with an integration of digital content into paper-based materials in order to facilitate learning. Constructive feedback, scaffolding questioning, and procedural scaffolding are three strategies applied into the instructional designs and learning system. Quasi-experiments for personal learning and collaborative learning were also conducted to evaluate the effects on learning performance, the results of which suggest that the three instructional designs had significantly positive effects on individual's learning performance.

Dunwei Wen, Yan Gao, and Guangbing Yang introduces how natural language processing (NLP) technologies can be employed to help build and improve NLI that can support ubiquitous learning. Through emphasizing semantic analysis such as semantic role labeling, semantic similarity, of natural language, and develop and use them to enhance question and answer processing, automated question answering, and automatic text summarization in educational system, they propose approaches to improve the technology of natural language processing and help develop different NLI systems in the ubiquitous learning environments.

Vive Kumar, Kinshuk, Thamarai Selvi Somasundaram, David Boulanger, Jérémie Seanosky, and Marcello Vilela offer a new perspective on learning and instructional attainments with big data analytics as the underlying framework, discuss approaches to this framework with evidences from the literature, and offer a case study that illustrates the need to pursue research directions arising from this new perspective.

Mohamed Koutheair Khribi, Mohamed Jemni, and Olfa Nasraoui provide a generic meta-level framework for a common description of TEL recommendation systems and present an analysis of several existing TEL recommendation systems with respect to their defined framework.

Alex Mottus, Kinshuk, Sabine Graf, and Nian-Shing Chen propose visualization mechanisms to support teachers to function effectively in ubiquitous learning environments, which provides one potential solution for unlocking the full potential of ubiquitous learning environments and allowing students to follow their own learning which being fully supported and encouraged.

Chun Chang, Maiga Chang, and Jia-Sheng Heh reveal the design of mobile educational role-playing game for doing informal learning in museum and then explains the game-play with mocked user's experience so readers can have clear idea of how the things work.

Moushir M. El-Bishouty, Kevin Saito, Tingwen Chang, Kinshuk, and Sabine Graf present an interactive tool for analyzing existing course contents in learning management systems based on learning styles, which allows teachers to be aware of the course support level for different learning styles. It aims at supporting teachers in adaptive and personalized learning environments to decide making efficient modifications in the course structure in order to meet the needs of different students' learning styles.

Ronghuai Huang, Yongbin Hu, and Junfeng Yang first define the learner experience in technology rich classroom as learners' perceptions and responses that resulted from physical environment changes, and they also propose the five elements of learner experience: value, usability, adaptability, desirability, comfortability. Finally, they identify the indicators for evaluating learner experience in TRC by deeply investigating the changing factors of classroom and the five elements of learner experience.

Kinshuk  
Ronghuai Huang

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