Introduction to the Special Issue on Personalization

Paul De Bra, Judy Kay, and Stephan Weibelzahl

In the traditional classroom, learning suffers from the difficulties that teachers face in meeting the needs of each student. At many times, it is unavoidable that teaching must take a “one size fits all” approach. Personalization in this setting is prohibitively expensive. Technology-enhanced learning offers the potential to implement not only personalization, but even automated personalization, typically called adaptation. Over the past 15 to 20 years, with the growing popularity of personal computing, a variety of methods and techniques have been developed to tailor learning content, instruction, or system behavior to the knowledge, needs, preferences, or goals of individual learners or groups of learners. These range from manual personalization techniques to artificial intelligence methods that reason about the learner. Such personalization and adaptivity have great potential for improving the user experience in technology-enhanced learning.

The research in this field has spawned a number of important conferences and journals, each targeting different aspects of technology-enhanced learning. The Artificial Intelligence in Education (AIED) and Intelligent Tutoring Systems (ITS) conferences and the International Journal of Artificial Intelligence in Education (IJAIED) address the artificial intelligence in the system as well as studies of the nature of learning and teaching. The User Modeling (UM) conference targets the basis for personalization: capturing, modeling, and reasoning over information about users. The Adaptive Hypermedia (AH) conference has dealt with the personalized access to information through hypermedia, notably, the important Web-based personalized systems. Technology-enhanced learning, in a broader sense, also comes together as a field in conferences like the American AACE ED-MEDIA and ELearn conferences and the European EC-TEL conference.

In the summer of 2008, the UM and AH conferences joined forces to start a new series of User Modeling, Adaptation, and Personalization (UMAP) conferences. Within their scope, applications in technology-enhanced learning have traditionally formed a large part of the conference programs. UM and AH researchers with a particular interest in learning joined forces to initiate this Special Issue on Personalization of the IEEE Transactions on Learning Technologies.

The call for contributions resulted in a large number of submitted research papers on a variety of topics, including authoring, delivery, evaluation, and validation of technology-enhanced learning. After careful selection and peer-review, we selected five papers for inclusion in this issue. Other high-quality papers could not be included in this issue, so you may wish to check out future issues for more contributions about personalization. We briefly describe the contributions of this special issue below.

The first paper, “Creating a Corpus of Targeted Learning Resources with a Web-Based Open Authoring Tool,” tackles what is perhaps the greatest challenge for pragmatic deployed systems which support personalized learning: the creation of learning resources that are available in a personalized environment. Authoring for personalized/adaptive learning environments requires “extra” effort because suitable learning material for different learners needs to be available. This paper reports on a prototype Web-based tool for open authoring of learning materials. Different authors may create learning material tailored to the features in user (learner) profiles. The study includes evaluation of the actual use of the tool by authors with different teaching status. This showed the feasibility of using this technology for developing a large corpus of material that can be used for personalized learning.

In the paper “Evaluating Learning Style Personalization in Adaptive Systems: Quantitative Methods and Approaches,” the authors considered the Felder-Soloman “visual-verbal” learning style dimension as well as the “global-sequential” dimension (which roughly corresponds to Pask’s “holist-serialist” dimension). Interestingly, a large study with 200 students found no advantage or disadvantage to adaptation in the visual-verbal dimension (even no disadvantage to a mismatch). A study with children 9-11 years old with the global-sequential dimension again failed to find any advantage or disadvantage from the adaptation in this dimension either. It is clear that the debate whether adaptation to learning styles is worth pursuing will still continue after this special issue.

The paper “Supporting the Development of Mobile Adaptive Learning Environments: A Case Study” deals with the problem that learners increasingly need to be able to continue learning when they are not at a fixed workstation. Two case studies were performed with computer engineering students learning about data structures and operating systems. Learning activities needed to be available...
on PCs, laptops, and PDAs. Adaptation was performed based on the learners’ progress with the learning material as well as to the context (the device used). Rather than simply adapting everything to the mobile environment, the CoMoLE system would mark certain activities as suitable or unsuitable depending on the environment.

Authors of adaptive/personalized learning material typically have to use “their best judgment” regarding how well the adaptation was designed. The paper “Constraint-Based Validation of Adaptive e-Learning Courseware” aims at providing authoring support in the form of a courseware authoring validation tool (CAVIAr). This formal modeling framework validates courseware using a constraints-based approach. In the future, authors should become able to select common constraints from a repository and have a tool verify whether the adaptive learning material (structures) they created satisfies these constraints.

Finally, the paper “Mood Recognition during Online Self-Assessment Test” considers the evaluation stage of the learning process. In particular, it considers the affective factors in learning and aims to provide tutoring systems with mood recognition methods for use during self-assessment tests. Diagnosing the student’s mood might help the student both psychologically and cognitively. This is new work in the rather new but active area that explores learning process. In particular, it considers the affective assessment tests. Diagnosing the student’s mood might help the student both psychologically and cognitively. This is new work in the rather new but active area that explores affective issues. It reflects the broader picture in the area of technology-enhanced learning in general, and of personalization in particular, that much important research remains to be done. We can expect to see that progress as it unfolds in future issues of this journal.

The guest editors of this special issue wish to express their gratitude to the reviewers who contributed critical insights that improved the papers. We are also indebted to Editor in Chief Wolfgang Nejdl and Associate Editor in Chief Peter Brusilovsky for making this special issue possible, and to Marion Wicht, whose help was invaluable in supporting our management of the editing and peer review process with three guest editors.

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Stephan Weibelzahl

Guest Editors

Paul De Bra studied mathematics and computer science at the University of Antwerp, where he graduated with “greatest distinction” and obtained a teaching certificate in 1981. He received the PhD degree in computer science from the University of Antwerp in 1987. In 1988 and 1989, he researched WYSIWYG interfaces and document processing at AT&T Bell Laboratories in Murray Hill, New Jersey. In December 1989, he joined the Computer Science Department at the Eindhoven University of Technology, where he is currently a full professor and head of the Database and Hypermedia Research Group. From 1987 to 2007, he was also a part-time professor at the University of Antwerp in the Information Science Department and the Computer Science Department. Professor De Bra performs research on different aspects of hypermedia systems and object-oriented databases. Currently, he is most active in the area of adaptive hypermedia and adaptive Web-based systems with applications in technology-enhanced learning, e-culture, and e-commerce. He has been a reviewer and/or (associate) editor for several journals, including the ACM Transactions on Information Systems, Communications of the ACM, IEEE Multimedia, Data and Knowledge Engineering, Computers in Industry, the Journal of Digital Information, Interacting with Computers, the Journal on Web Engineering, the International Journal on Web Engineering Technology, The New Review of Hypermedia and Multimedia, and the IEEE Transactions on Learning Technologies. He has been a reviewer or program committee member of the following conferences: The World Wide Web Conference, the ACM Conference on Hypertext and Hypermedia, the International Conference on Adaptive Hypermedia and Adaptive Web-Based Systems, the AACE WebNet Conference, Advanced Visual Interfaces (AVI), and the (Dutch) Interdisciplinary Conference on Information Science.

Judy Kay is a professor of computer science at the School of Information Technologies (formerly the Basser Department of Computer Science) at the University of Sydney, Australia. She is a principal in the CHI: Computer Human Adapted Interaction Research Group, leading research in advanced technologies for human computer interaction, supporting personalization, pervasive, and mobile interaction. Her vision is for it to support a highly personalized way for people to interact with the computers that they carry, those embedded within the environment, and desktop computers. She creates new tools for interaction in support of lifelong learning, collaboration, and personalized smart services. Examples of exploring novel interfaces for ubiquitous computing include new software for surface computing that enables people to interact at a table, new ways to access files when collaborating at a tabletop, and the Keep-in-Touch communication appliance. Her personalization research has created a framework for building personalized applications which enable the user to scrutinize and control the process of personalization. The core technologies are the Personis user modelling server and Personis-Lite. She has published extensively in conferences such as Pervasive, Computer Human Interaction (CHI), and User Modeling (UM, AH, UMAP), and in journals such as the IEEE Transactions on Knowledge and Data Engineering, the International Journal of Artificial Intelligence in Education, User Modeling and User-Adapted Interaction, Personal and Ubiquitous Computing, Communications of the ACM, and Computer Science Education. She has presented invited keynote addresses at UM 1994, ICAI 1995, ICCE 1997, the International Conference on Computers in Education, ITS 2000, AH 2006, and ITS 2008.

Stephan Weibelzahl is a lecturer at the National College of Ireland and a course director of two postgraduate programs on learning technologies. His main expertise is in the evaluation of adaptive systems, exploring the use and impact of adaptivity. He has been the co-organizer of a number of international workshops in the area of personalization, including a workshop series on the evaluation of adaptive systems held at the User Modeling Conferences and Adaptive Hypermedia Conferences. He is also a reviewer/program committee member of numerous national and international workshops and conferences on related topics (e.g., AH, UM, and UMAP), as well as scientific journals (e.g., UMUAI, IEEE TLT, KI, and KER).