P

References

Brusilovsky, P. (1996). Methods and techniques of adaptive hypermedia. *User Modeling and User-Adapted Interaction, 6*, 87–129.

Graf, S. (2007). Adaptivity in learning management systems focussing on learning styles (Ph.D. thesis). Vienna University of Technology, Austria.

Graf, S., Yang, G., Liu, T.-C., & Kinshuk. (2009). Automatic, global and dynamic student modeling in a ubiquitous learning environment. *International Journal on Knowledge Management and E-Learning*, *1*(1), 18–35.

Jonassen, D. H., & Grabowski, B. L. (1993). *Handbook of individual differences, learning, and instruction*. Hillsdale: Lawrence Erlbaum.

Knutov, E., de Bra, P., & Pechenizkiy, M. (2009). AH 12 years later: A comprehensive survey of adaptive hypermedia methods and techniques. *New Review of Hypermedia and Multimedia, 15*(1), 5–38.

Wild, F., Mödritscher, F., Sigurdarson, S. E. (2008). Designing for change: Mash-up personal learning environments. *eLearning Papers*, *9*. Retrieved from http://www.elearningeuropa.info/files/media/media15972.pdf

Personalized Learning Systems

Sabine Graf[1], Kinshuk[2]
[1]School of Computing and Information Systems, Athabasca University, Edmonton, AB, Canada
[2]School of Computing and Information Systems, Athabasca University, Athabasca, AB, Canada

Synonyms

Personalized educational systems; Personalized e-learning systems

Definition

Most of the learning systems typically used in educational institutions, such as learning management systems, provide the same courses, identical in structure, composition, and content, for all learners (Graf 2007). In contrast, personalized learning systems are learning systems that consider the individual differences of learners and tailor the learning experience of learners to their current situation, characteristics, and needs. By adapting courses, learning material, and/or learning activities to learners' individual situation, characteristics, and needs, personalized learning systems aim at increasing learners' progress and outcome, enabling learners to learn with less effort, for example, in terms of time required for learning, and offering higher learner satisfaction.

Theoretical Background

Each learner has individual characteristics and needs such as different prior knowledge, cognitive abilities, learning styles, and so on. These individual differences affect the learning process and are the reason why some learners find it easy to learn in a particular course, whereas others find the same course difficult (Jonassen and Grabowski 1993). Personalized learning systems address this issue by adapting courses, learning material, and/or learning activities to the learners' current situation, characteristics, and needs.

Besides the term "personalized learning systems," there exist other terms which are often used in a similar context. The term "adaptive learning system" stresses the ability of a learning system to automatically provide different courses, learning material, and/or learning activities for different learners and the term "intelligent learning (or tutoring) system" refers to systems that focus on the use of techniques from the field of artificial intelligence to provide broader and better support for learners. On the other hand, the term "personalized learning system" emphasizes the aim of the system to consider a learner's individual differences and treat each learner as an individual person. However, many of the learning systems developed based on the idea of tailoring education to learners' characteristics and needs can be considered as personalized, adaptive, and intelligent.

Personalized learning systems usually focus on personalization on the course level, meaning that such systems provide courses that fit learners' individual needs and characteristics. The personalization typically works in two steps. First, the respective characteristics and/or needs of learners have to be identified. This process is called student modeling and aims at building and updating a student model that includes information about the students' characteristics and/or needs. Brusilovsky (1996) distinguished between two different ways of student modeling: collaborative and automatic. In the collaborative approach, the learners provide explicit feedback which can be used to build and update a student model, such as filling out a questionnaire. In the automatic approach, the process of building and updating the student model is done

automatically based on the behavior and actions of learners while they are using the system for learning. Furthermore, student modeling can be done statically or dynamically. Static student modeling refers to an approach where the student model is initialized only once (mostly when the students are registering for the course). In contrast, a dynamic student modeling approach frequently updates the information in the student model.

In the second step, personalized courses are composed based on the identified characteristics and/or needs of learners which are stored in the student model. Such personalized courses can differ, for example, with respect to the learning objects/activities that are presented in the course, the number of presented learning objects/activities, the sequence in which particular learning objects/activities are presented, the presentation and layout of the course itself, the amount of additional support provided to learners, the navigation within the course, and so on. Brusilovsky (2001) pointed out two distinct areas of adaptation techniques for adjusting courses to students' characteristics and/or needs, namely, adaptive presentation and adaptive navigation support. Adaptive navigation support deals with providing students different ways to navigate through a course and includes features such as direct guidance, map adaptation, as well as adaptive sorting, hiding, annotating, and generating of links. Adaptive presentation deals with how the content itself is presented to learners and includes adaptation features based on content such as adaptive multimedia presentation, adaptive text presentation, and adaptation of modality.

Many characteristics and needs of learners exist to which a personalized learning system can adapt its courses to. One of the first characteristics that has been considered in personalized learning systems is the learners' knowledge level or prior knowledge. Later on, cognitive and pedagogical aspects have been considered more and more, leading to the development of systems that tailor courses to learners' learning styles, cognitive abilities, learning interests, learning goals, motivation, and so on. In addition, personalization features have been developed and integrated in learning systems, allowing, for example, to change the language or color schema of a course in order to enhance the possibilities for personalization in these systems.

Numerous personalized learning systems have been developed over the last years. These systems differ with respect to which adaptation techniques are used, which characteristics and needs of learners are considered, why adaptation and personalization is needed, where and when adaption and personalization is applied, as well as how adaption and personalization is implemented within the systems. Knutov et al. (2009) introduced and compared some of the most well-known learning systems with respect to these issues, discussing their concepts, architectures, and techniques used for adaptivity and personalization.

Important Scientific Research and Open Questions

When looking at which systems are currently used for education, it can be seen that personalized learning systems are applied only very rarely and that most educational institutions are using so-called learning management systems. Learning management systems are developed to support teachers in creating, holding, and managing online courses and present these courses then to learners. In contrast, personalized learning systems focus particularly on supporting learners, tailoring courses to learners' characteristics and needs, but provide only basic functions for supporting teachers. An open research issue is to combine the advantages of both, personalized learning systems and learning management systems, and to create systems that have rich support for teachers and at the same time are able to tailor education to learners' characteristics and needs.

Another open issue in the area of personalized learning systems deals with the combination of different characteristics of learners that should be considered when delivering personalized learning. Open questions related to the combination of characteristics include whether and how characteristics influence/compensate each other and how such effects influence the provision of personalization strategies of the system. Another open question in this context deals with the selection of characteristics that should be considered when providing personalized courses and whether these characteristics should be the same for all learners or might vary for each learner.

Furthermore, high potential can be seen in the development of learning systems that combine

P

personalized learning with other pedagogical models such as mobile learning, ubiquitous learning, game-based learning, collaborative learning, and others. Systems that implement respective pedagogical models can be merged with personalized learning systems, which would lead to more support for learners by improving the learning progress and outcome through tailoring the respective activities and concepts of each pedagogical model to the learners' current situation, characteristics, and needs.

Cross-References

▶ Adaptability and Learning
▶ Adaptation and Learning
▶ Adaptive Blended Learning Environments
▶ Adaptive Learning Systems
▶ Adaptive Learning Through Variation and Selection
▶ Computer-Based Learning Environments
▶ Individual Differences in Learning
▶ Individual Learning
▶ Learner Characteristics
▶ Personalized Learning
▶ Technology-Enhanced Learning Environments

References

Brusilovsky, P. (1996). Methods and techniques of adaptive hypermedia. *User Modeling and User-Adapted Interaction, 6*, 87–129.

Brusilovsky, P. (2001). Adaptive hypermedia. *User Modeling and User-Adapted Interaction, 11*, 87–110.

Graf, S. (2007). *Adaptivity in learning management systems focussing on learning styles.* Ph.D. thesis, Vienna University of Technology.

Jonassen, D. H., & Grabowski, B. L. (1993). *Handbook of individual differences, learning, and instruction.* Hillsdale: Lawrence Erlbaum.

Knutov, E., de Bra, P., & Pechenizkiy, M. (2009). AH 12 years later: A comprehensive survey of adaptive hypermedia methods and techniques. *New Review of Hypermedia and Multimedia, 15*(1), 5–38.

Person-Centered Instruction

▶ Learner-Centered Teaching

Person-Centered Learning

Jeffrey H. D. Cornelius-White[1], Renate Motschnig[2]
[1]Department of Counseling, Leadership, and Special Education, Missouri State University, Springfield, MO, USA
[2]Computer Science Didactics and Learning Research Center, University of Vienna, Vienna, Austria

Synonyms

Experiential learning (as used by Rogers); Learner-centered education; Significant learning; Whole-person learning

Definition

Person-centered learning refers to the facilitation of learning through an interpersonal climate characterized by empathic understanding, acceptance, and realness. While it is most coherent with the intentions and methods associated with (▶ Experiential Learning [Rogers]) such as dialogue and discussion, self-initiated projects, or working in teams and groups, research has shown that the attitudes of a facilitative interpersonal climate are more important than the specific methods involved. According to Rogers (1983, paraphrased from pp. 188–189), the Person-Centered Mode is characterized as follows:

- The precondition is: a leader or a person who is perceived as an authority figure in the situation is sufficiently secure within himself or herself and his or her relationship to others that he or she experiences an essential trust in the capacity of others to think for themselves, to learn for themselves.
- The facilitative teacher shares with the others – students and community members – the responsibility for the learning process.
- The facilitator provides learning resources, from within himself or herself and his or her experience, from books or materials or community experiences. He or she encourages the learners to add resources of which they have knowledge or in which they have experience. He or she opens doors to resources outside the experience of the group.
- The student develops his or her own program of learning, alone or in cooperation with others.