

## GUEST EDITORIAL PREFACE

# Special Issue on Personalised Learning

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Personalised learning, or the tailoring of curriculum, pedagogical approaches and the learning environment to each individual, provides a greater focus on the individual than any earlier approach to learning. In doing so, it has been concerned with adapting learning experiences and resources based on a wide variety of factors, including personal learning history, current location and context, available interactive devices, cultural preference, personality, learning preferences and gender, amongst others. A dominant source of personalisation derives from cognitive differences between individuals, whether in terms of their approaches to learning or, more commonly, what knowledge has already been acquired, and what skills have so far been mastered.

Additionally, new generation learners often like to customise their learning content and learning spaces/locales. They will personalise their interactions in the learning process, expressing themselves with their own user generated content, as much as the technology allows. And given fewer constraints than traditional learning has afforded them, they will learn whatever, wherever and whenever they desire, usually intermingled with other non-learning activities.

So we have two different kinds of personalisation. The first is about the system adapting to the individual learner, and the second is about learners adapting the system to themselves.

In parallel with the trend towards personalisation in learning, there has been an increasing focus on the importance of affect in learning. The cognitive and the affective are deeply intertwined, both in general and in learning in particular. Affective state is not only limited to the transient emotions that might be experienced during the learning process itself (such as frustration, or pride), but also the constant dispositions that learners bring to a learning situation, based on familial, cultural or other influences. Despite the acknowledged importance of emotions for learning, relatively little is known about how technology enhanced learning environments can, and importantly should, respond to these emotions in ways that enhance motivation and promote learning.

This Special Issue considers both of these themes. In the first instance, we consider how learning environments can be personalised and customised, both by the learners themselves, in accordance with their self-perceived needs and desires, and by educators in ways that align with their pedagogical philosophies. On the second point, within the realm of learning environments which adapt to the learner, we consider the subtle interplay between cognition and affect, looking at how each influences the other, and at how they are manifested in student behaviours and responses to the system.

This Special Issue contains four papers. The first paper, by Steve Goschnick, is concerned with the issue of how learners can personalise their educational interactions. It proposes a design route whereby the best facilities of Learning Management Systems, such as Moodle, can be combined with the best aspects of a Social Networking platform, such as Facebook, to create a Personal Learning Environment. Effectively this enables the learner to create a highly personal context for their learning. At the same time, it broadens the focus from an individual learner, to the learner and his/her social learning network, thus acknowledging the key role of social interaction for learning. The requirements for such a merger of designs are spelled out in some detail and look eminently doable.

The second paper, by Georg Weichhart and Chris Stary, explores the issue of how learning management systems might explicitly incorporate pedagogical knowledge and expertise, suggesting that existing systems have typically been “pedagogy agnostic”. In doing so, however, they are careful to propose a model where the pedagogical aspects of the LMS remain decoupled from its technical aspects, so that different pedagogies might be applied in different circumstances, or a particular pedagogy shared across different types of e-learning platform. As in Goschnick’s contribution, this paper sketches some of the technical requirements to ensure the kind of interoperability between system components that would support this delineation.

The third and fourth papers in this special issue focus on the learner and the learner’s interaction with the system, rather than on system design issues. The focus also shifts from e-learning systems to Intelligent Learning Environments. Both papers involve learners working with Intelligent Learning Environments that pose problems and monitor learners as they attempt to solve them step-by-step, with the ability to dynamically adapt to learners’ input so as to provide individualised support.

In the third paper, Sarah Schultz and Ivon Arroyo are concerned with the affective dimension of learning and the way that disaffection with learning can cause learners to “game” the system, in other words, to play around with the system to see if they can get it to tell them the answer, rather than concentrating on attempting to solve the problem it has set through their own best efforts. They compare a number of different models of student learning which consider combinations of cognitive and affective factors in order to determine best fit with student log file data obtained from two different Intelligent Learning Environments. They start with an analysis based on traditional Bayesian Knowledge Tracing, before considering augmented models which add in extra nodes and arcs (beyond simply inferred knowledge and known performance) in order to take account of gaming data and inferred learner affect. Interestingly enough, it appears that simpler models offered a better fit with the data, and were better able to predict future performance and “gaming behaviours” than the more sophisticated models.

In the fourth and final paper, Ma. Mercedes Rodrigo and Joseph Beck explore the phenomenon of “wheel spinning” where a learner gets stuck in a mastery learning cycle trying to solve more and more problems for a particular concept or skill, but without success. In a between-subjects experiment, students from the Philippines were observed learning with two systems: a standard Cognitive Tutor teaching about scatterplots, and a second version of the same tutor incorporating a pedagogical agent (Scooter) aimed at reducing gaming behaviour. The students’

affective states were observed and noted at regular intervals using a well-tried methodology. The researchers were interested in understanding the nature of wheel spinning in more detail, particularly the factors that influence it, and the relationship between gaming behaviours and wheel spinning. More broadly, they were interested in better understanding the ways in which cognitive and affective factors manifest themselves through student behaviour. They discovered that although wheel spinning and gaming behaviours are linked, wheel spinning appears to relate to purely cognitive states (i.e. knowledge deficits), whereas gaming behaviours are a function of both cognitive and affective factors.

We hope that this Special Issue will be of interest to educators and system developers alike. Firstly, it provides detailed suggestions for the design of future learning systems which can be personalised in numerous ways. Secondly, it includes finely-grained accounts of the cognitive and affective factors which enter into play when students interact with technology. We hope that both of these strands will stimulate further research and development in this rapidly moving field.

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