Chapter 12
Intelligent Tutoring: Active Monitoring and Recommendation

Manuel Fernando Rodrigues
Polytechnic Institute of Porto, Portugal

Ricardo Santos
Polytechnic Institute of Porto, Portugal

Sérgio Manuel Gonçalves
University of Vigo, Spain

Florentino Fdez-Riverola
University of Vigo, Spain

Davide Carneiro
University of Minho, Portugal

ABSTRACT

Society has been changing dynamically over the years and technology has been boosting that change. Teaching, as a social activity has not been changing at the same speed. Technology enhanced learning, arises as a way to cope with that challenge, opening new paths for learning. However, sometimes it becomes difficult to cope with student´s challenges: interest, motivation, attention, are difficult to achieve with the so called net-generation. With an amazing new world at the touch of their fingers, the focus is on new, challenging and interesting things, leaving very little room to other activities. Keeping students in the right track, interested and motivated is in fact an enormous challenge. Fatigue and stress play an important role in this equation: they can dramatically decrease students' performance. Controlling these factors, in such a way that´s unaware by students, is the best way to achieve better results, as the data gathering process does not interfere with the parameters being monitored. The aim is to forecast negative situations taking some actions to mitigate them.

INTRODUCTION

Modern society needs to be constantly fed with new knowledge, putting an enormous amount of pressure into the formation/requalification of their citizens. The need for qualified people is growing quickly, thus requiring a more efficient use of the limited resources that are allocated to education/training. Technology emerges as a way to enhance this learning/teaching process, providing new ways to achieve better results, and overcoming some known constraints such as qualified instructors availability, time restrictions or individual monitoring. Nonetheless, when using technology-enhanced learning, some

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drawbacks need to be carefully analysed. When a student engages into an electronic course, the interaction between student and teacher, without all its non-verbal interactions, is poorer. Thus the assessment of feelings and attitudes by the teacher becomes more difficult. In that sense, the use of technological tools for teaching, with the consequent teacher-student and student-student separation, may represent a risk as a significant amount of context information is lost.

Indeed, the teacher/student relationship is a crucial aspect in order to succeed in learning, both for the student and teacher, and is one of the main aspects determining the success or failure of teaching. Positive relationships, both in terms of respect and empathy, enhance students' abilities and commitment throughout the learning process (Hamre et al., 2006).

There are several studies that support the fact that a positive relationship between teacher and student, measurable by, among others, the number of conflicts, the degree of closeness or the support and dependency, is directly related to greater and easier adaptation to school, increase of social skills and improved academic performance (Battistich, Schaps & Wilson, 2004). Moreover teachers feel that these positive relationships have resulted in reduced levels of absenteeism and increased levels of cooperation and motivation from students (Klem & Connell, 2004).

As communication processes evolve to other levels, they shift increasingly to online platforms, in the so-called e-learning tools. These tools still have gaps that do not allow a rich environment regarding the communication between the teacher and the student. Moreover, managing possible conflicts and negative situations is much more difficult.

It is credible that the technology that physically separates and distances human relations, can be developed to levels similar to those in traditional methods of classroom teaching.

To accomplish this task, different fields of knowledge must intersect, such as Behavioural Biometrics (Yampolskiy & Govindaraju, 2008), Ambient Intelligence (Aarts & Wichert, 2009) and Behaviourism (Bouton, 2009), to develop a classification of the students' state, namely by observing their interaction with computers, and more specifically with e-learning platforms.

Since students' effectiveness and success in learning is highly related to their mood while doing it, such issues should be taken into account when in an e-learning environment. Aspects such fatigue and stress significantly influence students' performance and need to be taken into consideration (Rodrigues, Riverola & Novais, 2011).

The fundamental goal of any teacher is to develop and deliver instruction that inspire and invoke learning in their students. To achieve this, an understanding of how learning occurs is strictly necessary. Learning theories provide insight into the complex process of learning and so, they must be known by instructors. This is also especially true in e-learning environments, where it can even be considered if a new learning theory is required, or just the best selection and use of existing theories for each particular situation (Alzaghoul, 2012).

With all these constraints, monitoring the students' behaviour and providing recommendations in order to improve the learning process needs to be continually addressed, and especially in an online environment. Stress and emotions, in particular, can play an important (usually negative) role in education (Hwang & Yang, 2009; Williamson et al., 2005). In that sense, its analysis in an e-learning environment assumes greater importance in the sense that no other approaches can be used, such as in face-to-face, in which we easily understand contextual cues. The role of stress, frustration or fatigue on the emergence of conflicts between students and between students and teachers should also not be neglected. Thus, one of the key notions of this chapter can be put forward: the continuous assessment of the student's level