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TARGETING THE AFFECTIVE STATE OF STUDENTS STUDYING MATHEMATICS ON A WEB-BASED ILE

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In this paper, we discuss that diagnosing and taking appropriate action based on students' motivation and effort, as well as other affective characteristics, is an important part of effective ILEs. Acknowledging that a student's affective state is influenced by the environment and didactical situation, we conduct research by employing an already integrated web-based environment, namely walls, which students consider part of the teaching and learning process. The system's use and ongoing evaluation permits more realistic research on affective aspects which will be conducted by employing appropriate motivational theories and student models. Keywords is affective characteristics, modelling effort and performance, mathematics.

Lately, one of the main AIED issues has been intelligent learning environments (ILEs) that would teach and assist learning by targeting not only the cognitive, but also the, affective state of the student. Recent research and relevant literature observes the importance of these aspects. Our focus lies on systems' ability to diagnose and take action based on characteristics such as motivation and effort, in particular for mathematical domains. On the other hand, developing such educational systems is difficult due to the existence of numerous conflicting theories, and the complexity of evaluating them because of the influence of the didactical situation in the way students appreciate and interact with educational software. Particularly for mathematics the influence is stronger because of the importance of the accurate display of notation, the difficulties in inputting answers and the existence of multiple correct answers. All these should neither be neglected nor held as assumptions as they can easily lead to erroneous results. Therefore, we argue that it is better to investigate such issues in a specific context. Conveniently, the first author's occupation and interests involve the development of interactive materials for the teaching of mathematics as additional support to science and engineering students. This group of students is intriguing, mainly because they carry traceable misconceptions from school, they have diverse backgrounds, undertake different degrees and yet they attend the same modules.

To support these students, the School of Mathematics has integrated the web-based environment walls that contains interactive parts (multiple choice/response questions, self-practice questions) and embedded exploratory activities, which employ an adaptation of Dante’s mechanism as described. These provide context sensitive feedback at a text area at the bottom of the browser while students are able to ask for help or what to do next via a help button. The type of help students can get, is currently 'naive' as it has only the ability to suggest material according to predefined goals, prompts students not to abandon a page when they have not completed it, and it is based on several assumptions such as the reason that students ask for help. On

the other hand, particular attention was given during the development of the system to take into account students' needs through iterative pilot tests, careful observations, and students' interviews. For instance, both the feedback frame and the main window use appropriate mathematical notation and students can provide answers using their usual mathematical notation and not linear format which was proven to be confusing for them and obstructed their learning (together with our research in affective aspects as they were often frustrated and demotivated because of that).

Preliminary results and further work is the fact that it is now applied and in constant use makes students value its very existence: support for their studies and not an experiment in which they are called to participate. This allows detailed observations on students behave our and reactions, the evaluation of long-term retention and more realistic results. For brevity we cannot elaborate on the results, which show that the feedback and even the naive suggestions are closely followed by most of the students perceiving it as additional support during their interaction, but rather emphasize the fact that the logging facilities of walls permit detailed analysis of students' interactions, which often involve actions that might not have been taken in a strictly controlled experiment. These observations will facilitate further research on how to model effort, performance and generally their interaction with the system. Of course disentangling effort from the rest of the affective characteristics is a rather difficult task. Therefore, as a general framework, we propose to use de Vicente's model and aspects of the planner described to regulate the instruction. In addition, in order to be able to evaluate the system in reality, it will be enhanced with a model that takes into account cognitive aspects and students abilities. For instance, Active Math's student model fits particularly this description (especially since its designed for mathematical domains) and considering its usefulness as a framework we have already attempted to incorporate aspects of its API. The results from our preliminary data could inform the design of a "diagnose" of effort, performance or other characteristics (such as sensory interest). This analysis will be improved by a qualitative study to investigate what students perceive of their interaction. The latter, in conjunction with the paradigm where experts were questioned about students' interaction should inform further the design of a motivational component and the actions the system should take but also result to some insight into issues related to mathematics education where affective aspects are often neglected.

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THE NEW METHODS OF TEACHING ENGLISH

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There are many methods of teaching languages. Some have had their heyday and have fallen into relative obscurity; others are widely used now; still others have a small following, but contribute insights that may be absorbed into the generally accepted mix.