

Proceedings

# Learner Modelling for Reflection

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SUNDAY, JULY 20<sup>TH</sup>, 2003

VOLUME V OF AIED2003 SUPPLEMENTARY PROCEEDINGS

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## FOREWORD

The AIED community has always been interested in the general issues surrounding learner modelling, and the approach of opening learner models is becoming increasingly important. This is partly due to privacy issues, which have recently become a much-discussed topic in user modelling, and where open learner models raise interesting problems. Open learner models also offer an alternative path to inferential diagnosis by enabling students, peers and teachers to influence the diagnostic process, which may improve the quality of learner models. Particularly important from the student's perspective is the recognition that the learner model can be a useful source of information for the learner, as it can be used to support reflection on his/her own knowledge, misconceptions and learning process. During recent years, the number of researchers interested in the use of open learner models to encourage learner reflection has been growing. This is evidenced by the increased number of papers on open learner modelling in the main conferences of Artificial Intelligence in Education (AIED), Intelligent Tutoring Systems (ITS) and User Modelling (UM).

A forum for collaboration on the topic was created in 2002: a small research network called Learner Modelling for Reflection - LeMoRe (see <http://www.eee.bham.ac.uk/bull/lemore>). The workshop is organised by LeMoRe members and has the goal of developing the community of those studying open learner models both in terms of learning about each other's work, and setting a broad research agenda for future work.

The workshop follows the ITS 2002 workshop "Individual and Group Modelling Methods that Help Learners Understand Themselves", held in San Sebastian, Spain. This, in turn, followed the workshop on "Open, Interactive and Other Overt Approaches to Learner Modelling", held at AIED 1999 in Le Mans, France.

### Workshop Themes

The aim of the Learner Modelling for Reflection workshop is to provide a forum for focussed discussion on the following themes:

1. to advance the theoretical study of the use of open learner models in encouraging learners to reflect on the domain being studied, on their own strategies for learning, on their progress in learning, on their own understanding as they think about the progress of peers, etc.
2. to consider the insight open learner models can bring to teachers allowing them to inspect (and possibly change) the models of their learners, which may promote teachers' reflection on their own practice.
3. to consider the comparative advantages and disadvantages of open learner models in relation to the use of learner models in adaptive systems designed to pursue different kinds of learning (domain-based learning, problem solving, strategic thinking, creative thinking, team work, etc.)
4. to consider the use of (closed) learner models to inform system decisions related to promoting reflection, and how these uses compare with the application of open learner models, taking into account different pedagogical goals and individual differences.

5. to consider the problems and advantages of open learner models in relation to data protection laws, the ethics of learner modelling and the desire for privacy.

## **Contributions**

Theoretical studies of the use of open learner models in encouraging learners' reflection have been undertaken by researchers for several years. Some of these works are presented at this workshop.

Hansen and McCalla provide an account of how the idea of Active Learner Modelling can be applied to the notion of Open Learner Modelling - the power of the idea is to look both at content and the use to which the content is put. They raise a number of interesting issues relating to data protection and the empowering of the citizen. Cimolino, Kay and Miller investigate the application of concept mapping to elicit a learner's understanding as a basis for building a learner model. An experimental study showed the need for incremental analysis and its link to reflection both on what is problematic with the student's representation of the conceptual structure of the domain and what is going to be stored in the student model. This work also points out a possible way of using aggregated class models to help teachers reflect on their teaching. Dimitrova presents an approach to dynamically extract individual learner models by engaging learners in diagnostic interactions. A framework for maintaining diagnostic dialogues is outlined and illustrated in STyLE-OLM, an interactive open learner modelling system. Zapata-Rivera and Greer provide an interesting approach to measuring student reflection based on a taxonomy of reflective actions. They develop a way of examining students working with a system and, using their method, find that more reflective activity takes place when students do not work on their own. The implications include the suggestion that working with pedagogical agents can promote reflection. Rueda, Larraqaga, Ferrero, Arruarte and Elorriaga describe their DynMap Concept Map editor which can be used by students to build their own models, and let the students see what the system believes they know. Their work also accepts the reasonable argument that teachers should also have access to the student model but does not yet take this further and discuss the nature of any consequent teacher and student communication. Chesher, Kay and King provide a web-based virtual patient simulation for the diagnosis and management of chronic illness. They explain how reflection can be encouraged both through giving access to the user model as well as the user models of peers and experts.

While the ten papers accepted for the workshop address the above themes reasonably well, there are areas which are not covered. For example, we find that so far little work has been done on comparative advantages. On the other hand, new issues have emerged which are of interest. Bull, McEvoy and Reid address the issue of how mobile computing can take advantage of open learner modelling, and consider the problems encountered when seeking to work with open learner modelling in a mobile learning context. Kutay and Ho are working on the infrastructure needed to provide the kind of rich comments for students working on ill structured problems, while Tzovalzi and Fiedler aim at building a dialogue system for mathematics which is intended to promote reflection through hints and through engaging the student in a dialogue, so that students reflect on their reasoning and then improve their answers. Grigoriadou, Tsaganou and Cavoura also organise their contribution around a dialogue, but in the area of understanding historical texts. Their approach provides an evaluation of how the reflective dialogue helps learners.

We hope that these papers will stimulate discussion at the Learner Modelling for Reflection Workshop at the 2003 Artificial Intelligence in Education Conference in Sydney, Australia. Information on future developments will be available through the LeMoRe research network.

### **Acknowledgements**

We thank the members of the program committee for all their help and support: Jim Greer, Frank Linton, Gord McCalla and Tanja Mitrovic.

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