

Individualised Revision Material for Use on a Handheld Computer

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Abstract

This paper introduces an adaptive learning environment for use on a PC and a handheld computer. At the end of the PC session, revision material tailored to the needs of the individual and appropriate for viewing on a handheld computer are recommended for synchronisation to the handheld device. Thus the student has access to additional individualised mobile revision material for use at times and locations where it would not normally be possible or convenient for them to study, but where they might nevertheless welcome this opportunity.

Keywords: learner model, revision material.

1. Introduction

With some exceptions (e.g. Ketamo, 2002), there has so far been little consideration of the potential for individualisation in mobile learning.

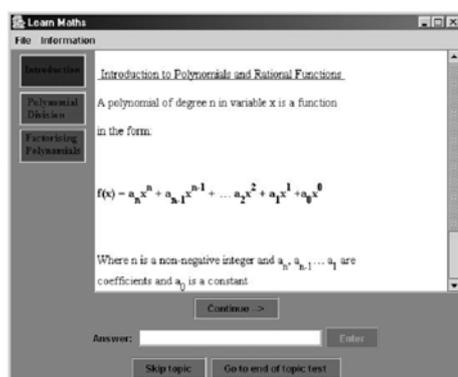


Figure 1. The PC-based tutoring system

This paper addresses this issue, presenting an adaptive learning environment for use on a desktop PC and handheld computer, designed as a support for an undergraduate mathematics course. Students use the PC version of the system to review and practise material taught during lectures, and to obtain individualised feedback on their responses (Fig 1). They may then take away tailored revision material on their handheld computer for later consultation.

2. Learner Modelling

As the student answers questions in the PC component of the system, it automatically builds a model of their knowledge and of their misconceptions. This learner model is used in part in the conventional manner, as information to allow system adaptation to the needs of the individual. It is also used at the end of the session to suggest suitable mobile revision material that the student can synchronise to their handheld computer: material that is tailored to their specific current learning requirements. This enables the student to continue learning away from the PC, at times and locations where individualised interactions would not normally be possible, but where the student might nevertheless welcome the opportunity for further study. Roy et al (2002) also argue for learning materials based on student responses to questions. In addition to dividing the interaction between the desktop PC and handheld computer, our system extends this notion by offering tailored revision materials according to a student's learner model, the materials aiming not only to help the learner

understand areas of difficulty, but also explicitly addressing their misconceptions. The learner model can also be synchronised for viewing.

3. Mobile Revision Material

If a student appears to be having only minor difficulties, the mobile revision material (Fig 2) is quite brief, having the function of reminding the learner. However, more detail is provided if the

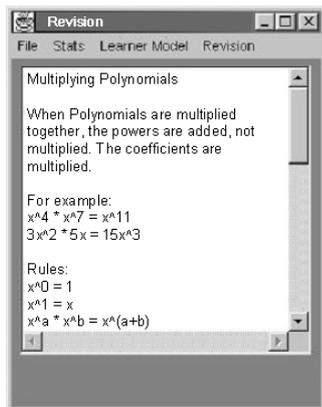


Figure 2. Tailored mobile revision material

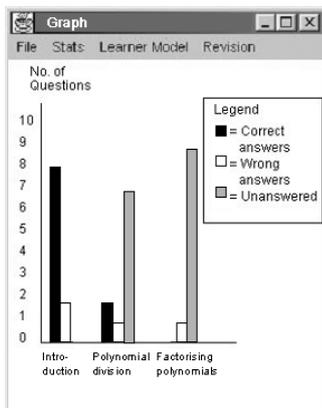


Figure 3. Mobile open learner model: overview

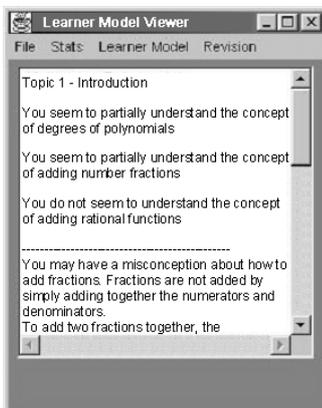


Figure 4. Mobile open learner model: details

learner model contents indicate more serious problems or misconceptions, and if possible includes descriptions referring to concepts already known, to support explanations.

The mobile learner model can also support revision as it may be viewed. The learner may see an overview of responses in the form of a graph illustrating their performance (Fig 3), and also specific textual descriptions of topics they know, and explanations of likely misconceptions (Fig 4). The open learner model is designed to help students plan their learning, and prompt reflection on the learning process. It is based on a study exploring the contents students desire in a mobile open learner model (Bull, 2003).

When a student returns to the PC, they are given a brief test on the revision material in order to update the learner model to ensure that the new PC interaction will be adapted appropriately for their current understanding.

4. Summary and Further Work

In-depth maths tutoring takes place on a PC, where it is easier to interact with information and obtain a well-structured overview of each topic. The mobile revision material based on the student's performance, and the mobile version of the learner model, are intended as an additional interaction to the main computer session for review at a convenient time and place on a handheld computer. All mobile learning content is tailored to the specific needs of the individual.

Future work will involve evaluation of educational and usability issues of the desktop PC system, the mobile revision materials, the two versions of the open learner model, and the effectiveness of uniting the two components of the learning environment in a single system.

5. References

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