What Did You Do At School Today? Using Tablet Technology to Link Parents to their Children and Teachers

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Abstract. The Homework project is developing an exemplar system for the delivery of adaptive, interactive numeracy and literacy education for children (5 to 7 year olds) at home and in the classroom. We illustrate how a user centred approach has enabled us to specify and go some way towards developing technology to meet the clear need for a better way of helping parents to engage with their children's homework and understand what they have done at school.

1   Introduction

The Homework project at Sussex University is developing an exemplar system for the delivery of adaptive, interactive numeracy and literacy education for children aged 5 to 7 years at home and in the classroom. It uses a combination of interactive whiteboard, tablet PC and wireless technology. The interactive whiteboard is for use in school; the tablet PCs can be taken home by each child for use with help from parents. Children watch TV quality video material, undertake exercises and project work as well as play games based on Number Crew materials for basic arithmetic [1]. The system is based upon the Broadband Learner Modeling pedagogical framework [2] and is the subject of a Human Centred Design methodology. We are combining theories and techniques from Narrative and from Artificial Intelligence and Education to produce a system that can scaffold a learner's progress in an adaptable and adaptive manner across multiple contexts and technologies [3-8].

2. Prototyping the Home-School link

In December 2004 we conducted an empirical evaluation of a limited prototype version of the Homework system (not linked to the learner modeling component) with a class of 32 six-year-old children and their teacher at School A. The Homework home interface used in the trial was developed in Flash, and links to Director, MPEG, Flash and PDF content, see Figure 1. From the home page it provides three views, a *history* of recent work through which relevant media can be revisited, *this week at school* with links to content used at school and *this week at home* with activities for home. The system logs all tablet PC activity for later analysis (and in due course for updating the learner model).

The study used an interactive whiteboard, wireless network and 5 tablet PCs in the classroom. On each weekday of the study we worked with a group of 5 children (selected by the teacher) who used the tablets for 20-30 minutes in class and took them home at the end of the day. The whiteboard was used with this group for video, singing and a polling application. The class teacher used the whiteboard for whole class video and interactive teaching

programmes (ITPs). Each child was able take the tablet home for at least one night. Content was drawn from Number Crew material about division and multiplication. It fitted the curriculum objectives current for this class at the time of the study. The video and ITPs used by the teacher with the whole class were also available on the tablets.

Our study data include: classroom observers' notes including comments from the teacher and teaching assistants, parents' comments in diaries, usage logs from the Homework system and data entered (e.g. answers to exercises). Additional logging software (Activity Logger) captured information about how the tablets were used. We are currently analysing the data, but it is clear that the children were highly engaged by the content and were excited by and enjoyed the physicality of having their own tablets. The class teacher was also positive; he liked the integration of the technology and activities with his current numeracy work. Of the 29 diaries containing helper comments 24 contained sentences using 'fun/like/love/enjoy' using the system. Often this was explicitly linked to the idea that learning could be fun. 'Excited/couldn't wait/eager to use it' appears 14 times often coupled to the idea that the children were eager to do 'homework'. It was also clear that activity had often been in collaboration with a parent or other carer. Several parents mentioned helping the child with an activity and two diaries specifically mentioned a perceived improvement in the child's attention while doing Math activities on the tablet as opposed to on paper. Two diaries explicitly mention pleasure at being able to see what the child had been up to at school.
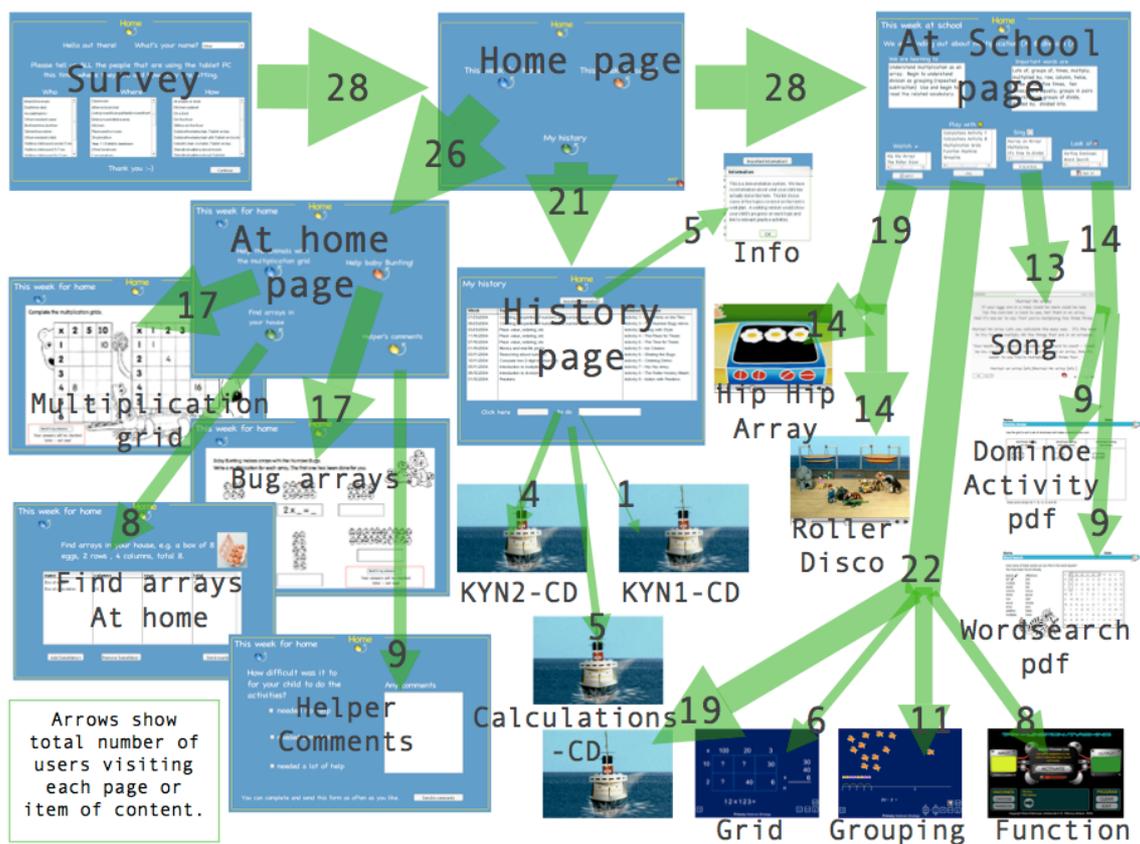

Figure 1. Homework 'home' interface – showing usage of the interface and content.

The following negative comments identified (the number in brackets indicates the number of occurrences of that comment): slowness (at start-up and clicking and waiting) (3), frustration with failed handwriting recognition (3 of these mention left handed issue) (5), specific

difficulties with home or content interfaces (3), activities too easy (1), activities too difficult (1), made arm ache (1), it needs a stand (1), child doesn't want help (1)!

The log data from 28 sessions (4 logs were lost) illustrate that 100 percent of sample visited 'this week at school' and launched 1 or more pieces of linked content (see Figure 1). 93 percent visited 'this week at home' with 100 percent of these launching 1 or more pieces of content. 75 percent visited 'My history', though few of these actually launched activities.

3 Discussion and Conclusions

Our analysis has indicated that the large majority of parents and carers want to help their children with homework, that they are willing to devote time to this activity. All parents who were asked said that they would like to know more about what their children did at school each day: children don't want to or can't remember sufficient to tell their parents. Similarly, teachers expressed the desire for parents and carers to participate in learning activities at home and to follow their child's school learning experiences. Nevertheless, the practice and effectiveness of the links that already exist between home and school varies greatly. This should be a situation where technology can help, provided that it is designed to meet the users' needs and integrate with the users' context. Current school practices are components in the learning culture to which each learner belongs and must be taken into account when technology is introduced. The user centred design approach adopted throughout our work enables us to explore and map the context and participants for which the technology is being developed, it informs each phase of our system design: the development of the prototype technology and the empirical design used for the school study were informed by our previous interactions with teachers, parents and children.

Parents and teachers initial enthusiasm about the homework system illustrated in our early studies was confirmed when they were offered the opportunity to use the prototype system. All of the work described here has contributed to the detailed agenda of issues that we will fold into the development of the next iteration of the homework system during which we intend to develop further those parts of the system that provide assistance to the teacher in designing activities for the day, as well as the interface for home use that provides the all-important links between parents and what their children are doing at school.

References
[1.] Luckin, R., et al. *Coherence Compilation: Applying AIED Techiniques to the Reuse of Educational TV Resources*. in *Intelligent Tutoring Systems*. 2004. Maceio, Brazil. p. 98-107.

[2.] Luckin, R. and B. du Boulay, *Embedding AIED in ie-TV through Broadband User Modelling (BbUM)*, in *Proceedngs of 10th International Conference on Artificial Intelligence in Education*, J. Moore, W.L. Johnson, and C.L. Redfield, Editors. 2001, IOS Press: Amsterdam. p. 322-333.

[3.] Vygotsky, L.S., *Mind in society: the development of higher psychological processes*. 1978, Cambridge, MA: Harvard University press.

[4.] Wood, D. and H. Wood, *Vygotsky, tutoring and learning*. Oxford review of Education, 1996. **22**(1): p. 5-16.

[5.] Luckin, R. and B. du Boulay, *Ecolab: the Development and Evaluation of a Vygotskian Design Framework*. International Journal of Artificial Intelligence and Education, 1999. **10(2)**: p. 198-220.

[6.] Wood, D.J., J.S. Bruner, and G. Ross, *The role of tutoring in problem solving*. Journal of Child Psychology and Psychiatry, 1976. **17**(2): p. 89-100.

[7.] Jackson, S., J. Krajcik, and E. Soloway. *The Design of Guided Learner-Adaptable Scaffolding in Interactive Learning Environments*. in *Conference on Human Factors in Computing Systems*. 1998. Los Angeles, California, United States: ACM Press/Addison-Wesley Publishing Co. New York, NY, USA.

[8.] Tunley, H., du Boulay, B., Luckin, R., Holmberg, J., Underwood, J. Extending SCORM to model collaboration in contrasting school and home environments, Proceedings of User Modelling 2005, in press.