

When the NINF came home: guiding parents and children in the co-construction of narratives linking home and school learning.

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Abstract

Dialogues between children and parents about school are often uninformative providing little understanding of what a child is learning, how she is progressing and how a parent might better support this. We aim to help children, parents and teachers co-construct richer multi-perspective narratives linking home and school learning and hence improve overall understanding of the child's learning. Our approach employs concepts from previous work on a non-linear interactive narrative framework. Here we describe a novel interactive learning environment, which travels between school and home on tablet PCs, and has helped improve parental understanding of children's school-based learning. We discuss the limitations of this work, indicate some future directions and ask how else theories of interactive narrative might be used to enrich the stories parents build about their children's learning.

Introduction

*“What did you do at school today?”
“Don't know”*

When parents ask their children about what happened at school the resulting conversations are frequently unsatisfactory, at least from the adults point of view. Such dialogues provide little if any support to a parent wishing to construct a better understanding of her child's learning and progress, and how she might become more involved in this. Furthermore, parents can feel that opportunities for parents and teachers to come together and build a shared understanding of a child's learning experience are limited and often considered unsatisfactory (Luckin, du Boulay, Smith, Underwood, Fitzpatrick, Holmberg, Kerawalla, Tunley, Brewster and Pearce, 2006). Homework activities themselves can lead to both positive and negative outcomes for child and home, with a key factor being the nature of the input from parents (Hallam, 2004). Many parents report that they feel ill-informed about how best to support their children's formal education (Kerawalla, O'Connor, Underwood, du Boulay, Holmberg, Luckin, Smith, and Tunley, under review). Other research suggests this may be due to a lack of continuity between the home and school contexts and insufficient advice and feedback from school (e.g. Kerawalla and Crook, 2002; Lewin, Mavers and Somekh, 2003). Our aim is to improve the quality of parent child interaction associated with homework and school learning and also facilitate home-school dialogues. We are interested in how mobile technology and interactive learning environments can be used to help children and their parents and teachers interactively co-construct multi-perspective narratives about a child's learning over time. We believe this will lead to greater understanding for all and facilitate more supportive relationships, consequently impacting positively on learning. It can also

support better integration of the home learning practices with the more formal world of the classroom and so increase their value (Hughes, Andrews, Feiler, Greenhough, Johnson, McNess, Osborn, Pollard, Salway, Scanlan, Stinchcombe, Winter and Wan Ching Yee, 2005). During the HOMEWORK project we have moved towards this goal.

Here, we describe how we used tablet PCs travelling between school and home and a novel learning environment (Luckin, du Boulay, Underwood, Holmberg, Kerawalla, O'Connor, Smith and Tunley; in press) to help parents, children and teachers co-construct richer narratives linking home and school learning. This work builds on the Non-linear Interactive Narrative Framework (NINF) (Luckin, Underwood, du Boulay, Holmberg and Tunley, 2004) and employs the concepts of *narrative guidance* and *narrative construction* arising out of earlier work in the Multimedia, Education and Narrative Organisation (MENO) project (Plowman, Luckin, Laurillard, Stratfold and Taylor, 1999).

In this paper we present our understanding of narrative, the NINF and narrative guidance and construction. We then describe the HOMEWORK system and how it aims to support children, their parents and teachers in the co-construction of narratives about learning. Next, we report on the extent to which HOMEWORK achieved this aim when children and their carers used it at home and in school through a series of studies. Finally, we describe some of the limitations of the system, ask what more theories of interactive narrative might contribute to this work and indicate how the HOMEWORK system might be further developed to better support the construction of richer dialogues linking school and home learning.

Narrative, Learning and the NINF

Bruner (1996) describes narrative as “a mode of thought and an expression of a culture's worldview”. He suggests that we make sense of our own thoughts and experiences, and those of others through the active generation of narrative. In this sense, narrative shapes our knowledge and experience and is central to our cognition. Narrative is fundamentally linked to understanding. The narrative process allows us to make sense of the world and to share this with others. This emphasis on the active role of the ‘reader’ is present in much post-modern literature, which frames the members of the audience as active participants in the production of meaning from the script or text. Social Constructivism (Vygotsky, 1986) similarly stresses the need for active participation on the part of the learner. It requires that both learners and teachers are active participants in a process of mediated communication. In the HOMEWORK project we include adult carers of children in this process of mediated communication where they act both as learners and as teachers – they learn about a child’s learning experience and become more actively involved in helping the child learn.

Within this context we are particularly interested in the narrative an interested parent attempts to construct when trying to understand what a child has been doing and learning at school and how she might become more involved in supporting the child. For every parent, the narrative she constructs will be different and will be scaffolded by the available prompts; scraps of information from the child (e.g. “don’t know”, “nothing” or some more informative comment), distant recollections of personal school experiences, perhaps some knowledge of the curriculum and pedagogy, memories from a few minutes chat with a teacher at the last parents’ evening, notes on this year’s objectives on a lost photocopy sent home with the child at the beginning of the course, insights gleaned when the child unexpectedly reveals a new skill, etc... Often, the available prompts from which a parent attempts to build the story of a child’s learning experience will be inadequate and perhaps even misleading. This may in fact also be the case for a teacher attempting to build a complete picture of a child’s learning experience, not perhaps knowing the full home circumstances of the child. Our suggestion is that well-

designed and appropriately used technology can provide integrated access to better prompts from which parents, teachers and children can all construct more satisfactory and complete narratives around a child's learning.

Narrative can be conceived of as a framework within which explorations can occur, a macro-structure with a network of causal links and signposts (Plowman et al., 1999) creating global coherence, contributing to local coherence and aiding recall through its network of causal links and signposting. Within this overarching structure there are inter-related elements each with their own micro-narrative. In fact, within formal education there may be several layers of this structure with a macro-narrative that is, for example, at the level of a lesson within which there are different elements. This lesson is itself also part of a term's curriculum and therefore in a sense a micro-narrative too. And the school-term itself is of course just an element of the child's life-long learning experience. In the home, a piece of homework is a micro-narrative but it is also a part of the macro-narrative of a child's learning story. However, the links between a piece of homework and the overall learning experience are often not clear to the child and perhaps even less so to an adult carer. The links between formal school-based learning requirements and informal 'life skills' learning can also be unclear, e.g. when counting out pocket money, cooking together etc... For many parents the interactive narrative describing a child's learning will require too much cognitive effort to synthesise the disparate pieces of information into a coherent story at the macro-level. This information might arise from comments made by the teacher in a home-school reading log, from the parent's own observations or from the child herself. It will have arisen across different times and in and from different locations. As a consequence of the effort required to integrate all this information, the reader, in this case the parent, may disengage or at least become distracted from the main message of the learning episode, and this may in turn detract from her ability to understand the concepts to be communicated and her ability to assist the child. Our hope is that technology that travels between home and school can be used to provide better, more timely, signposts that help the reader to link these macro and micro narratives in a coherent story leading to greater understanding and more integrated home-school learning.

We want to help children and particularly the adults who care for them see the links between the layers of macro and micro narratives as well as to keep track of the individual narrative elements themselves. In order to do this we provide what we have referred to previously as Narrative Guidance (Plowman et al., 1999) and facilitate co-construction of more adequate, helpful and richer stories about the child's learning, by integrating and sharing child's, teacher's and parent's perspectives. The important factor here is that all participants must contribute in the activity of creating the links between the different elements of the narrative. Interactive technologies, which move between school and home, allow us to support co-construction of multi-perspective narratives about a child's learning and they also allow us to experiment with the nature of the narrative guidance we offer to parent, child and teacher. The Non-linear Interactive Narrative Framework can be applied to guide the design of learning environments, which provide appropriate narrative guidance and help learners to construct their own personal narratives. The NINF framework distinguishes two aspects of narrative:

- Narrative guidance: the design elements that teachers and/or software need to provide in order to help learners interpret the resources and experiences they are offered and
- Narrative construction: the active process of meaning making, stimulated by the available prompts (physical and digital), combined with the vast reservoir of knowledge that each person brings with them to the experience. Through narrative construction learners (parents, children and teachers) discern and impose a structure on learning experiences, making links and connections in a personally meaningful way.

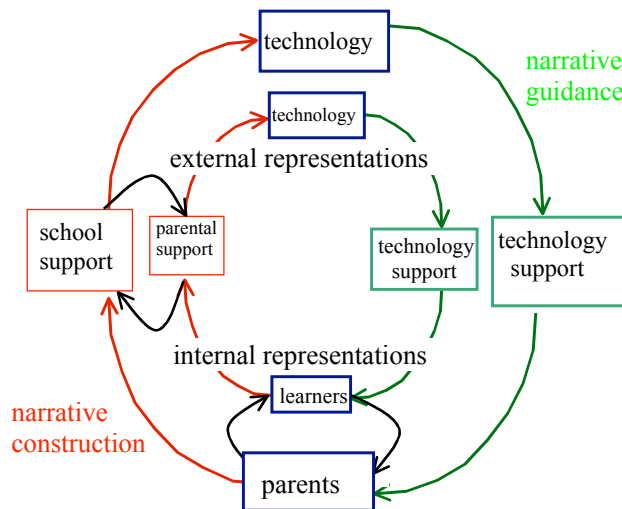


Figure 1: The cycle of narrative guidance and narrative construction across school and home. (adapted from Plowman et al., 1999)

In a productive learning experience, narrative guidance and narrative construction form a dynamic cycle. Authors and readers jointly construct narrative. Our vision of a home-school linking technology is illustrated in Figure 1 above. This process facilitates cycles of guidance and construction in which teachers, learners and parents (and carers) all act both as authors and readers and share learning narratives and the prompts these are built upon.

The NINF in HOMEWORK

The home-school linking technology we have developed and evaluated during the HOMEWORK project is a first step towards supporting parents, children and teachers in the co-construction of rich cross context multi-perspective narratives about learning. Here we describe the system we developed and indicate the ways in which it supports the cycle of narrative guidance and construction described in Figure 1.

The HOMEWORK System

At an abstract level the HOMEWORK system supports the coherent delivery of rich media educational content to groups and individual learners using a variety of devices both in and out of school contexts. Each individual learner has a mobile device that travels between contexts. This device supports communication between contexts and records learner activity. In our studies we used a library of digitised TV episodes, interactive activities and electronic paper content drawn from the Number Crew (made for Channel 4 Learning by Open Mind Productions); a complete set of material supporting numeracy learning for year 1 and 2 primary school children. The teacher and every child had an individual tablet PC for use in class and at home. In class an interactive whiteboard was also available and was used to deliver content suitable for group activities. Teachers planned the school lessons and linked home activities, which used Number Crew and other media, prior to delivery and the requisite content for both school and home activities was pre-loaded on the individual tablets. At school, learner tablets and the interactive whiteboard were controlled from the teacher tablet over a wireless network. When a learner's tablet was started up within range of the school wireless network it launched the 'school' interface. This consists of a grey screen with the learner's name and provides no access to any applications. The teacher could launch and stop activities and videos on individual devices or groups

of devices working directly from her on-screen lesson plan. Hence when in school, learners had limited control over which activities they worked with. The teacher could elect to launch an individual activity or a sequence of activities, this second option allows the learner some limited control as they progress through the teacher selected sequence.

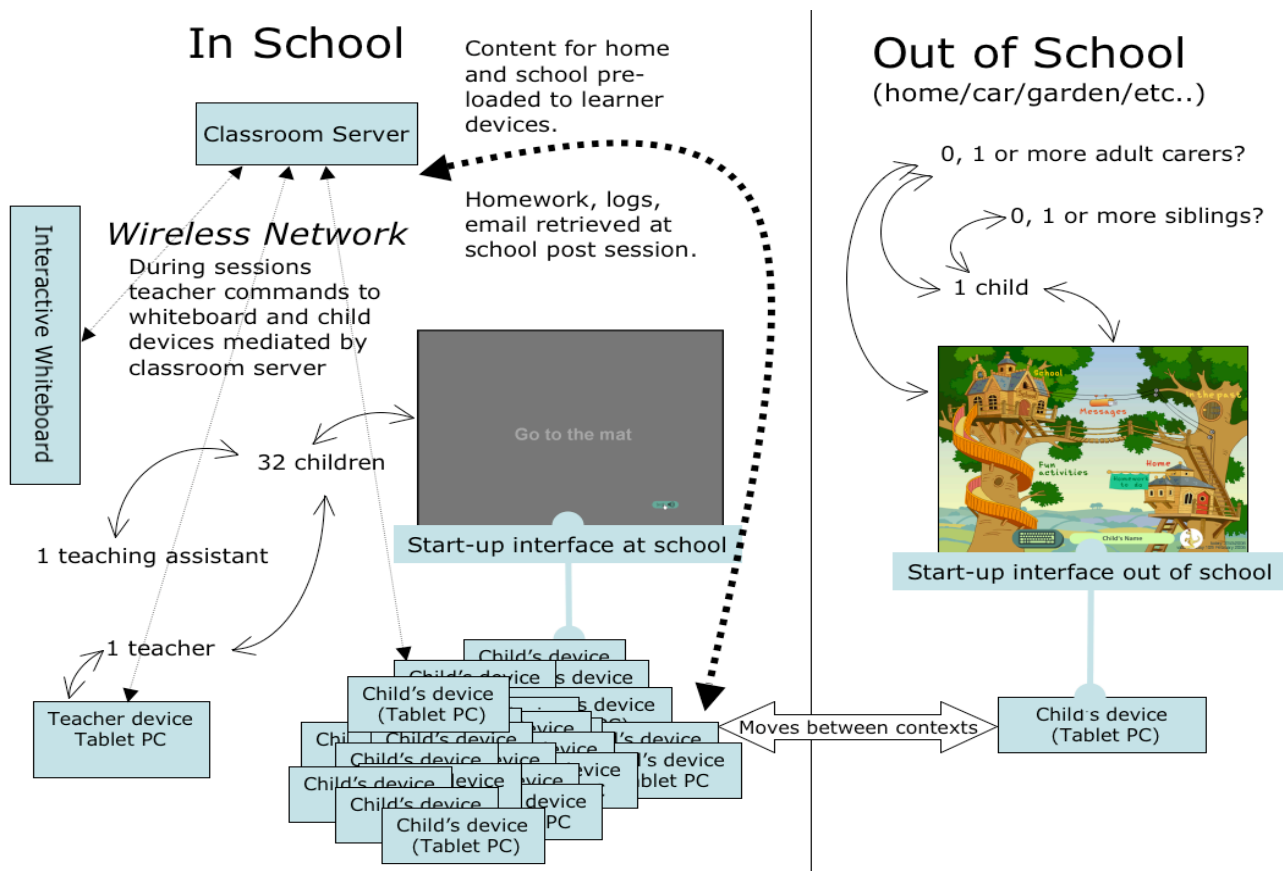


Figure 2. The Homework System and interactions, at school and in the home.

The Home Interface

When the learner tablets were started up out of range of the school wireless network, they launched the Home interface. The Home interface provides structured access to learning resources and related information relevant to the individual child user's current and past numeracy learning. The Home interface consists of five sections:

- I. the "Home" page provides links to current homework tasks,
- II. the "Today at school" page provides links to media used in today's numeracy session,
- III. the "In the past" page provides access to previous school and home tasks and media,
- IV. "Messages" opens a mail client which can be used to exchange email with the teacher,
- V. "Fun activities" provides links to a selection of potentially fun applications that are less directly related to any current educational objectives (see Figure 2).

All pages have an option to display additional text information that is primarily directed at adult carers. This information aims to contextualise the linked media by describing the current numeracy objectives and key vocabulary, and suggesting how these might be practised in out-of-school informal contexts and how parents might become involved with this learning.

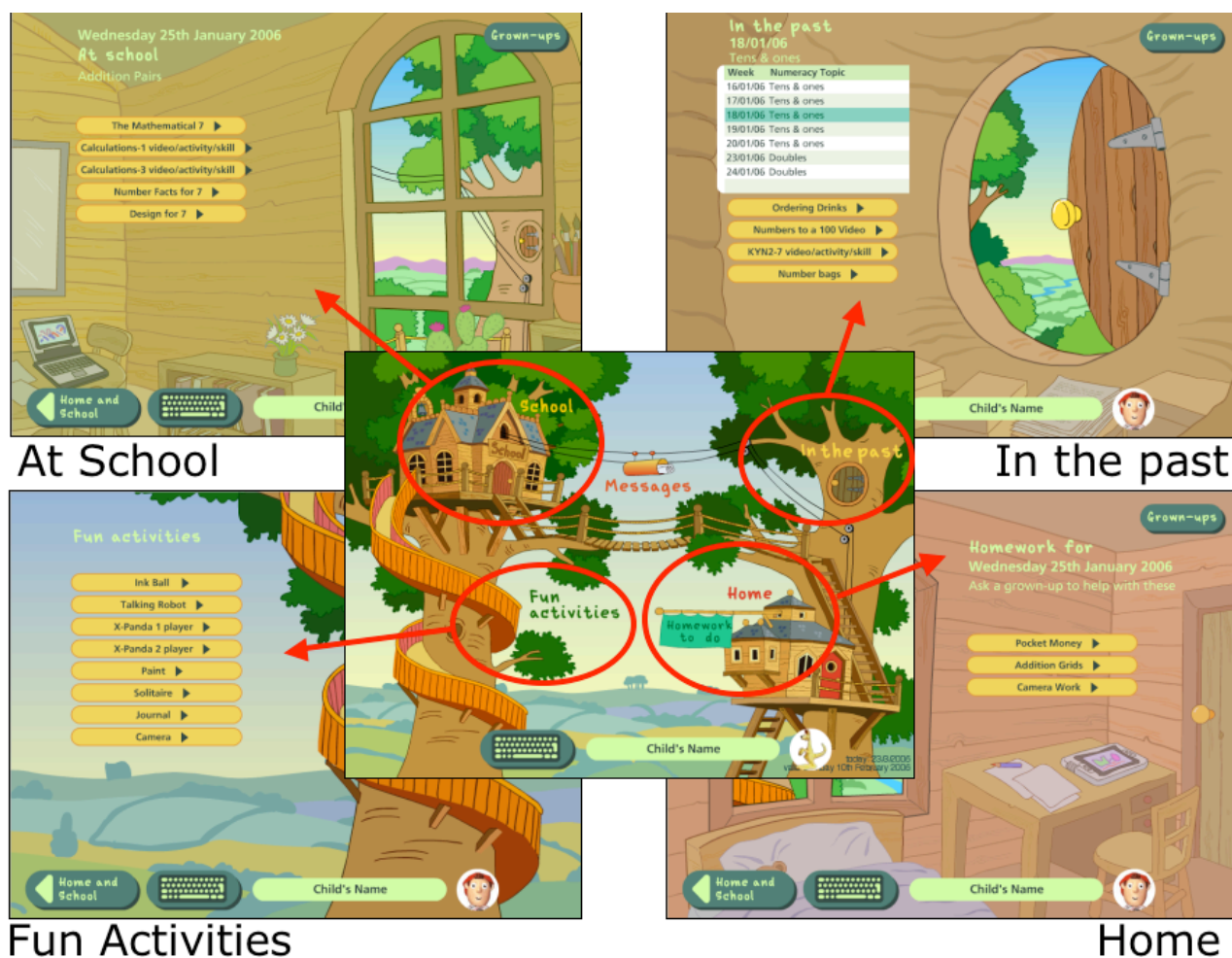


Figure 3. The Home interface. The centre image is the home start-up page. Hotspots (in red) link to: “At school” (top left) has links (yellow buttons) to the resources used in today’s school numeracy session. “In the past” (top right) lists numeracy topics from previous days, selecting one of these reveals links to resources used for that numeracy session. “Home” (bottom right) has links to the current homework activities. “Fun Activities” (bottom left) has links to a selection of applications and games. Clicking “Messages”, in the centre of the home page, opens an email client which can be used for parent and/or child to teacher email communication.

Developing the HOMEWORK system

The HOMEWORK system and Home interface evolved over the course of a 3-year project. It was developed using a Human Centred Design (HCD) approach through which teachers, parents and children helped the research team to specify and evaluate user and system requirements. For a full description of this process see Luckin et al. (in press). Throughout the time of the project we worked with over 30 teachers, 60 families and have evaluated 3 semi-functional prototype systems in two different primary schools and with three different classes of children. The types of data collected included diaries completed by parents and carers, interview data, comments from teachers and teaching assistants, observation notes and detailed software logs of home usage from each tablet PC. In the sections that follow we use illustrative examples of the findings from these evaluations as appropriate. A fuller discussion of these findings can be found in the other project publications already identified (Luckin et al., 2006; Luckin et al., in press; and Kerawalla et al., under review).

How does HOMEWORK guide and support narrative construction?

Narrative guidance can often be seen in the prompts and structures within which teachers and educational resource designers embed learning experiences precisely in order to help learners interpret and contextualise the resources and activities they engage with. Without such scaffolding learners can find it difficult to make connections between isolated learning events and the larger picture of their learning, and its relevance to their daily lives. The prompts that help learners construct the narrative of their learning may be provided in a variety of forms: the spoken comments surrounding learning activities, written instructions, navigation structures in books and software (e.g. chapter headings, button labels), etc. Guidance may also originate from many sources, e.g. teachers, peers, older siblings, publishers, parents. For the learner (and adult carers), there can be considerable effort in bringing together these multiple sources of guidance from disparate times when constructing an understanding of the bigger picture. Our work with parents revealed in particular that they needed more information about what their child was learning, where their child might need support and how that support might be provided within the home. Even within schools, where teachers work hard to build up a strong relationship between home and school, parents still feel that the school could do more to overcome what they perceive as “one way traffic”. The HOMEWORK learner’s device goes some way to relieving this by making some of the connections between the numeracy subject matter, time and context explicit within the interface. The interface maintains a personal history of each child’s numeracy learning. It offers the facility to revisit learning media used previously by the child both when she was at school and at home. It provides some contextual structures relating these media to points in time and curriculum objectives. It also provides perspectives on this information suited to both adult and child readers and serves as a prompt around which the learner and other interested parties can build dialogues about the child’s learning. Parents who worked with us felt that the system helped to increase their understanding of what their child was being taught:

“it means that if C[child] starts to talk to me about something she’s done at school, you know what she’s talking about”. As well as increased information about the content of what was being taught parents felt they also understood more about the language being used at school: *“I didn’t know what an array was! I was amazed that they were using that language with him and he knew what it was”*. In terms of contextualising the child’s learning, parents felt clearer about how what their child was being asked to do as homework related to previous work done in the class: *“I didn’t know there was such a strong link, I felt maybe it was a bit more haphazard”*.

Narrative construction is the active process of meaning making, stimulated by the available prompts (physical and digital), combined with the vast reservoir of knowledge that each person brings with them to the experience. Through narrative construction, learners (parents, children and teachers) discern and impose a structure on learning experiences, making links and connections in a personally meaningful way. Narrative construction therefore takes place in the heads of the participants and is supported both through conversation with others and the tools provided within the environment including those built into learning resources. In the HOMEWORK system narrative construction happens around the device with its stored content and in the heads of the children, carers and teachers and is supported by sharing perspectives through both spoken and/or written communication, for example as a piece of homework is completed using a worksheet on the tablet PC and the camera to capture images. This construction is ‘prompted’ by the tablet PC itself as it moves between school and home and also by the more explicit guidance provided by its contents. As an artifact, the tablet PC has a socially constructed definition that invites interaction between individuals both around and through it. However, the device also offers tools to support narrative construction by allowing all parties (parents, teachers, children) to author and share content. This goes beyond the construction of individual homework pieces and can provide links into other aspects of the learner’s life. For example the

information and tools provided by the tablet can help parents to see how they can extend the dialogue they hold with their child about numeracy into family life. For example, in the allocation of pocket money: *“I’ve got a lot better understanding of what level they were operating at, and the theme of what they’re looking at...if you’re giving them their pocket money or things like that... instead of giving them a fifty pence, or something, then you can give them five tens and you can back up and reinforce that message”*.

Child Perspective Narrative Guidance

From the child’s perspective the device itself can be seen as a prompt around which she can build conversations: a bit of school that comes home or a bit of home that goes to school. Through her device the child has access to reminders of what she did ‘At school’ today. *“C[child] came home very excited and seemed very confident on what she had to do. Straight away it seemed fun and she wanted to do the exercises and show us all how it worked and what she could do, introducing us to the Number Crew.”*

Through the ‘In the past’ page she is able to return to past learning experiences and see the sequence of her experience. The ‘Home’ page reminds her of her current homework assignment, which may be contextualised within individually directed written comments from the teacher. Using the device she may construct (perhaps with an adult carer) answers to her homework assignments, which are then ‘read’ by her teacher. In this process she may also use the built-in camera to take photos that can be combined with and support the text she constructs. She may also choose to use email, Journal, Paint and/or the built in camera more freely to author self-motivated content that can be shared with adult carers and/or her teacher. Parental reports of children’s interactions around the tablet illustrate how it supported children in initiating dialogue with parents (and carers) relating to their schoolwork:

“C [child] was keen to show his sisters (aged 4 and 8) the video on the tablet PC. He played on some of the [Number Crew] games, so did his older sister.”

“C [child] was very eager to show us her skills today. She wanted to do her homework and completed all her at home activities ... she used her abacus to help her!”

Adult Carer Perspective Narrative Guidance and Construction

Adult carers, interested in a child’s learning, can use the device and its content as a prompt for conversation with the child. Instead of asking “what did you do today at school?” and relying on the child’s memory and interest, a parent can ask to be shown what the child did today. As the learning media are accompanied by the relevant information about curriculum objectives, key vocabulary and suggestions aimed at parents, the adult is able to integrate this information in her overall picture of the child’s learning. The device maintains and updates this information as the child uses it, and therefore the adult is able to revisit the information in convenient moments both in the company of the child or alone. The log data collected on the tablet PCs illustrates that they were used a lot at home and suggest that some parents used the tablets individually after children had gone to bed.

Messaging (email), between parents and teachers, is also supported. This potentially allows a cycle of interaction between the parent and teacher in which the teacher may guide the parent’s growing understanding of a child’s school learning and the parent may guide the teacher’s understanding of the child’s learning and out of school experience. Questionnaire data collected from 16 parents suggests that parental enjoyment of homework activities increased with their increased involvement. Parents also indicated that they received more information about what their child was doing from both their child and the school when the tablets were used: *“I realise now that I need to know how school is teaching them how to do maths i.e. subtraction. Mum and I do it differently!”*

A further encouraging feature of the tablet PCs was their ability to encourage children to become independent and more self-sufficient with their homework. We believe this independence was related to the tablet providing strong continuity and contextual cues between school and home. This enabled the children to revisit schoolwork and progress with homework on related themes, with built-in support for parents available if the child needed help from them. This is an important finding in the context of increasing evidence that homework activities are most productive when the child takes charge and ‘invites’ parental contribution (Hallam, 2004).

Teacher Perspective Narrative Guidance and Construction

The teacher can author narrative guidance for both adult carers and child learners by embedding activities within written comments at authoring time. As every child has her own device, content can be personalised, as can the comments about curriculum objectives and suggestions to adults, and these act as guidance to the carer (and child). The system also allows the personal ‘history’ of learner activity maintained by each device to be interleaved with the messaging that is supported between teacher, parent and child. This integrated multi-perspective history can potentially support the teacher in constructing a detailed understanding of each child’s learning. It is this persistence of past work and activity and its interlinking with commentaries authored by teachers, home carers and children that potentially facilitates cycles of narrative guidance and construction. The teacher who took part in our longest evaluation of the HOMEWORK system, which lasted 4 weeks, expressed the following view: *“yes I think it’s great, before I was only able to issue homework that was either worksheet based or activity based or physical where they’ve brought something in.. the fact that they’ve got a camera to use, access to videos and activities it’s really exciting. It’s opened up a link as well between home and school... the parents have been happy that they can see what we do at school as well. It’s a good thing.”*

Discussion

In summary, as result of our experience in the HOMEWORK project, we believe that:

- Personal mobile devices carrying content between home and school can improve links between school and home learning and close the gap between parents, teachers and learners.
- The device itself is important, as well as the content that resides on it. Children very much enjoy having their own personal tablet PC and carrying it between school and home. The device’s mobility is significant; we found it was used in a variety of locations (e.g. in the car waiting for a sibling’s dance class to finish, on the kitchen table, on the floor etc...). This portability facilitates interaction with others around the device. We do not believe that the same interactions would be produced if the same content were accessed over the Internet via a desktop PC in the home. Indeed some previous research (e.g. Kerawalla and Crook, 2002; Mateas, Salvador, Scholtz and Sorensen, 1996) suggests that parent child collaboration around school work on desktop PCs in the home is limited, perhaps because home computers are often located in peripheral, private spaces.
- Appropriate contextualization of activities across school and home contexts is a key design principle. This contextualisation is itself a form of what we have called narrative guidance. For learners this can be provided by the continuity of using the same device at school and home. For adult carers guidance can be provided through explicit linking of content to objectives, the school curriculum and life skills using appropriate language. Parents often do want to know more about what their child is doing at school, and with the tablet PCs and appropriately contextualised content parents felt that they receive sufficient information about what children were doing.

- Maintaining a history of activity is important in guiding the narrative that parents, children and teachers construct about a child's learning. This can help children and parents make the links between learning events at the micro level and wider learning at the macro level, both informal and formal. Linking this history to attainment also allows children to see a cumulative effect of doing the work, for example through certificates awarded at key stages. Adult carers also want to see how a child is progressing. For the teacher, a history of activity can provide an insight into what is being done at home and provide valuable assistance in tracking the learning of the 30 or so individual children in a class.
- The combination of learners with individual mobile devices and a HOMEWORK like system has the potential to open up new forms of communication between children, teachers and parents resulting in well integrated school-home learning. This can be achieved by supporting teachers, children and their adult carers in authoring and reading a persistent interactive narrative around learning events and media. However, the software that enables authoring and exchange of this communication must be easy-to-use, to hand at the right times and offer suitable guidance to authors (parents, children and teachers) with very differing perspectives and abilities.

The HOMEWORK project has often succeeded in prompting better dialogue between parents (and carers) and children around schoolwork, as reported in the previous section of this paper. The tablet, 'home' interface and its content in combination have provided sufficient narrative guidance to enable child and parent users to construct more complete narratives about a child's learning. However, the tools offered to support narrative construction in the form of written (or otherwise persistent) communications, in particular on the part of children and parents, have been more limited and less well utilised. Although we have evidence of attempts by children to use email in the 3rd study, it was not used frequently or successfully, or by parents at all. Nevertheless, some parents did use a facility, only available in the 1st study, for adding text comments directly to homework activities on the tablet. Also, many parents provided handwritten comments in paper-based diaries. There are several possible reasons why email was not well used in the 3rd study; amongst these are general unfamiliarity with e-mail and the need to negotiate potentially confusing dialogues about working in offline mode. However, we suspect there is another critical issue; this is that the facility to comment needs to be closely associated with the content that provokes that commentary. Our model for the 'Home' user interface separated 'Messages' from content (see Figure 3), users had to navigate to 'Messages' leaving the content behind. On reflection, a model that allows close integration of comments with the activities that might prompt these, better suits the kind of interactive co-construction of narratives around learning that we wish to support. The HOMEWORK system provides a platform that can support this kind of co-construction of multi-perspective learning narratives. Future work needs to improve the interleaving of newly authored comments with content. A better model than e-mail for this kind of interleaving of communication might be the 'weblog'. This would allow content from school to be presented much as it is currently within the 'Home' interface but it would also allow comments and responses to homework tasks and other content to be added and authored within the same interface, without requiring navigation to a separate application. This would enable authors to easily associate these new 'stories' with the other content travelling backwards and forwards between school and home. For example, a homework task, the teacher's comments that contextualise this, the learner's response to the task, an adult carer's comments relating to how the child did the task, the teacher's feedback on the response, the task's relevance to the curriculum and possibly other information would all be visibly linked within the user interface. This in turn would become part of the growing history showing the bigger 'macro' picture of the child's learning.

A related area for improvement is the tools provided for constructing learner, parent and teacher generated content. Tablet PCs, with built-in cameras, microphones and handwriting recognition have great potential to support children and parents in constructing communications relating to home learning. These features should enable the telling of richer stories, incorporating (handwritten) text, audio, pictures and video, more akin to mobile phone Multimedia Messaging than typically textual email. Such multimedia communications from the home can serve as additional narrative guidance for teachers building a more complete picture of a child's learning. However, the software that enables the construction of these stories needs to be easy-to-use, particularly for the young age groups we have been working with. It should be as easy to use as the best of current mobile phone MMS software, allowing text, audio, photos and or video to be easily recorded and strung together. It also needs to support child and adult authors in differing ways appropriate to their individual needs. Facilitating the creation of rich stories about home learning and the communication back into the school content may also help to address the need for increasing the recognition within formal education of informal home activities (Hughes et al., 2005 and Sefton-Green, 2004).

Where next for the NINF?

An area that is open for future study concerns the narrative that children construct about the business of going to school at all: their role and agency, the teachers' roles and power and also those of their parents and carers. In one sense the problem of answering the question from the parent about what the child did at school is not just a problem of recall or understanding on the part of the child. It is also an issue about the legitimacy of the question and of the degree to which going to school is in fact a three-way (inexplicit) contract between the child, the school and the home and not just a pair of bilateral arrangements: child/parents and child/teachers. There is a qualitative difference between bringing home work that one has done at school (e.g. a painting, a story or split peas glued to paper to make a design) from bringing home a tablet on which the same work that was done at school can now be redone at home (or indeed the other way round). The child will experience the comments and help with this work from both her carers and from her teachers and will start to make a story about how they are similar and different in their reactions and also how they are implicitly working together, though in different contexts, for the benefit of the child. So the co-construction of narrative also involves the child building an understanding of carers and teachers who do work together. In many ways this is similar to the way that the child, in a traditional nuclear family, starts to make a story of how "Mummy" and "Daddy" operate both together and apart as the more general notion of "parents".

In a similar vein the tablet, its travels between home and school, and the comments from parents who have tried to help children with the very same tasks that the teacher has helped with open up the issue of the narrative that the teacher constructs for herself about the division of labour and power in the schooling of the child. Even for schools and teachers keen to involve parents there will often be a certain professional distance and sense of ownership of the process that puts the teacher in control and the parents in a subordinate position. So the tablet and what it contains and how it is used may be a force for a change in the nature of relationship between teacher and parent and hence of the story they each tell themselves about the other.

Conclusion

In conclusion, the consideration of children, parents and teachers as both authors and readers involved in the co-construction of integrated learning narratives which link stories of formal and informal learning both in and out of school provides a valuable perspective. By working to provide support appropriate to each of these individuals both as authors and readers we believe we can help them build integrated multi-perspective narratives around a child's learning. This in turn can result in increased

understanding, better support and ultimately an improved learning experience. The HOMEWORK system has made some progress towards this goal and has demonstrated the value of individual mobile computing in support of this endeavour. Many more useful insights leading to tools to support authoring, reading and sharing learning stories might be drawn from further consideration of ideas in interactive narrative theory.

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