Home-school Technologies: Considering the Family

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ABSTRACT
Research has focused on building technologies to support children in their transitions between home and school [9] without a developed sense of how individual families react to such technologies. We interviewed three different families about their reactions to ubiquitous computing technologies designed to support home-school transitions. We found that families were willing to use such technologies to share information among themselves, but that mechanisms for filtering this information would be a challenge for designers. Further, families were reluctant to share information with outsiders, such as teachers. We will discuss the implications of these findings for both future technologies, and further research into their design.

Keywords
Home-school, Family, Ubiquitous Computing, Children

ACM Classification Keywords
H1.2 [Models and Principles]: User/Machine Systems – Human Factors; H5.3 [Information Interfaces and Presentation]: Group and Organization Interfaces; K3.0 [Computers and Education]: General; K4.1 [Computers and Society]: Public Policy Issues – Privacy.

INTRODUCTION
As Rosalind Edwards acknowledges in her book on the subject [3], children live a dual life as citizens of home and school. Bridging the gap between these two contexts has been the focus of much research [6, 9], which has sought to use technology to join them.

Developments in networked and mobile technologies now provide us with more methods than ever for supporting children in the transition between home and school, from mobile phones that allow them to call parents and arrange journeys home, to memory sticks that allow them to transfer documents, to websites allowing supplemental learning activities in the home (both school and home driven). Emerging technologies promise to automate this process further. Locational systems can be used to make sure children are safe in their movement from home to school [8], and mobile learning devices promise to move education out of the classroom, into children’s everyday lives, reacting to context, and providing targeted material [10].

Associated with these current and potential devices is an increase of data. Not only are there safety concerns about the protection of such data, but ethical concerns about the rights of children in gathering it. For example, how do we justify increasing links between home and school, when children are often active in resisting such information transfer [4]; how do we tie this in with research suggesting that the home is a site of ludic activity – where the focus is play, and educational values may be a priority [5]? This research attempts to start answering such questions. Rather than focusing on a particular piece of technology, as previous research has done, we presented families with a range of technologies, to get a broad picture of the privacy and rights issues that might be raised. We were also keen to interview families as a whole, to see how they reacted as a household, as well as individual children or parents.

STUDY OUTLINE
This particular study forms part of a three-year research project in technologies in the home and homework, looking at designing technologies for children across the contexts of home and school. It follows a set of discussion groups about use of technologies in the home and homework conducted at school with N=180 children, and a set of video diaries taken by N=8 families of their daily routines. In current work, nine families with boys at a British school with high use of educational technology were recruited, and ethnographic interviews took place at their homes; three of these families were invited to our research laboratory to view some ideas for technologies that might support their homework. The ethnographic interviews suggested the families were generally familiar with technologies in their everyday lives. There was a range of ages and family structures represented across the families concerned:

Family A: The boy, aged 12, was an only child, living with his father and mother. Only the father attended the session. The family had a single computer, alongside the lounge area, put together by a member of the wider family, but generally not a wide range of family technologies.

Family B: The boy, aged 14, had a younger sister, aged 12, and both lived with their father and mother. Both parents were present. This family’s use of technology was relatively high, with shared and personal facilities, and the
boy particularly encouraged to use computers to overcome dyslexia-related writing problems.

Family C: The boy, again aged 14, had an older sister, aged 16, and both lived with their mother, who was present. The family had a single computer, in the mother’s bedroom, which seemed to be the central technology in their house, and was equipped with a scanner.

**Technology Demos**

In order to gauge families’ reactions to the technologies, we wanted to give them the chance to look at and try a range of technology demos. These exposed them to ubiquitous computing technologies that would gather contextual information, and provide ubiquitous aids to their home-school and homework lives. The demo technologies were chosen to solve difficulties raised by the families during their ethnographic interviews, but also to evoke family reactions by detailed capture of data about their home lives:

**Journeys between home and school** were seen as an important transition for family members, and a big issue for parents in managing their children’s time. This demo contrasted a browser-based piece of software that could automatically relay locational information from mobile phones with an ambient awareness system that automatically displayed the same information on a wall.

**Moving information between home and school** was the second issue raised in the interviews we chose to focus upon. In order to illustrate aids for transfer of information between home and school we fitted a lounge area with embedded sensors so family members’ actions could trigger information transfer, recording, and retrieval.

**Finding information** and judging its quality was the last issue we picked. We used enhanced search engines and a mixed reality video conferencing display to suggest ways in which children could obtain access to subject experts. The search engines were set up to provide educational and child-relevant information, and the display was used to allow children to select experts from a virtual space, and then interact face-to-face with them, and ask questions.

A debrief used a semi-structured interview to gauge families’ reactions to these technologies, and they were asked to discuss applications of the technologies in homework, and their wider daily lives. The interviews were analyzed for core themes by our group of researchers.

**KEY ISSUES**

Initial reactions to the technologies were enthusiastic, with families keen on viewing the new technologies, and seeing benefits to the increased availability of information through these. However, when we asked them to consider the technologies within their own homes, both parents and children became more skeptical. In particular, they were concerned with how the technologies might affect relationships, both within their families, and between their family and the outside world.

**Family Relationships**

Our first section will look at how these technologies reflected on relationships within the family. Here, the idea that information about children could be more easily shared amongst family members was discussed.

Parents were keen on technologies that could be used to record information about vulnerable members of society, although generally the children and parents in our sample rejected the idea that they were still vulnerable at this age:

[Boy] “I’m not sure it would be much use in like our situation, because we’re old now, it’d be more for young children”

[Mother] “Yeah, that’s what I mean by sort of vulnerable people” [Family C].

Within the children we interviewed, aged 12 to 16, the older children were more strongly against technologies that recorded information about their activities, such as the sensors and the mobile phone trackers. Vulnerability was not high enough in this age group for parents to have unlimited access to information, although all families thought some types of information sharing might be useful for them, and did not always react negatively to it:

I wouldn’t feel like I was being tracked on really, so I wouldn’t know much about it [Boy, Family A].

However, concerns about information exchange between family members seemed to reflect complex relationships within the family. For example, children’s rights not to be watched by their parents seemed related to their responsibility to do homework. But conversations often considered that children had the right not to be monitored even when they acknowledged they did not always see this responsibility through, as seen in this conversation about technologies that might record whether the children had opened their homework textbooks:

[Boy] “I like being able to lie about it!”
[Girl] “You could just open it and leave it there, you know”
[Boy] “And close it occasionally” ...

[Mother] “a general ‘oh yeah, they’ve looked at this book’ is in some ways fair enough, and in other ways, isn’t enough information, but you kind of, you’ve got to have a kind of trust as well that they’re doing it” [Family B].

Especially in older children, this idea of trust regardless of trustworthiness came up again and again – where vulnerability became lower, parents could afford to trust children regardless of their actions:

“you know if she was out on a Saturday night, it probably is better that I don’t know actually!” [mother, Family C].

**Trust as not sharing information.**

So while parents were worried about children to the extent they were vulnerable, technologies that gathered information about the children were seen as problematic. This was especially true in areas that were seen as the child’s responsibility, such as their school and social lives.
Increased trust of parent for child was required as the children got older. Our families suggested that technologies that monitored activity, such as the mobile phone tracker and sensors, moved from expressing concern to expressing distrust as children aged. A gradual change demands only a drop-off in monitoring technology use - after all, families have generally stopped using baby monitors by age 12. However, the design of tools to manage such a drop-off may well be problematic. Suchman [11, 12] has used examples of workplace tools to argue that technological attempts to make nuances explicit simplify interactions, bring the tool into focus, and cause breakdown in communication. By forcing family members to make explicit when they do and when they do not trust their children, overall family trust may well be undermined.

**Family and Others**

Outside the family, the message was simpler – parents were very uncomfortable with sharing data about their child, and home, and children were equally guarded. The storage of any kind of data about the domestic was seen as susceptible to abuse, and the networking of recorded information was seen as inevitably open to outside access:

"you’ve got a database so people can watch what you’re doing" [son, Family B].

Even familiar ‘outsiders’ were not trusted with unrestricted access to the home. The concept of using the two-way video conferencing technology to talk to others, even teachers, was unpopular:

[daughter] "Erm, it didn’t feel intrusive, because it was just... if it was in homes or something, I think it would”
[interviewer] “Yeah, so we’re talking about this TV screen being able to do the same sort of thing, so we could actually go”
[daughter] “In your home?”
[interviewer] “In your home, or, or in your classroom, or”
[daughter] “I think it’s a fun concept”
[interviewer] “Right”
[daughter] “But I wouldn’t like it in my own home”
[son] “It could be more useful in like, public places” [Family C].

Families were very concerned about letting domestic information out to others, and could only be convinced, even in the context of education, to use it to solve family problems – such as proving a child’s study record:

[Boy] “checking whether, seeing how long we’ve been doing the homework for, just to make sure you do it properly”...
[Father] "The exams are important, I was sort of saying, if he failed them all, it wouldn’t be very nice, but it’s not the end of the world, but if you could use something like this to demonstrate that, yeah, he used the maths” [Family A].

The contrast between how our participants viewed information sharing within family and outside family was particularly strong for the mobile devices. Families saw the use of phones between parents and children as a symmetrical relationship, with the tracking technologies seen as coordinating devices for families:

"it would probably minimize the phone calls of 'where are you? how long are you going to be?' them sort of things, erm, and like for us, to know when we’ve left work, or I’m still at work" [mother, Family B].

However, no family mentioned the uptake of this device in homework, and they were wary about the mobile devices being used by external agencies in general:

"I wouldn’t mind people knowing where I was but sometimes they can get it wrong... And they can, you could almost be accused of something that you were perfectly innocent of simply because they could place you there" [mother, Family C).

**Domestic information is a type of personal information.**

While trust could mean not sharing information, only relationships based on trust were capable of supporting an exchange of information. This echoes previous research, showing that locational information is generally only revealed to close family and friends [1].

Negative reactions to sharing information from the home centred on highly situated information. The more personal information was, the stronger the reaction against sharing it. What made some information more sensitive? Searching technologies were hardly ever contested, even when they recorded information about the kinds of searches families used. This is presumably because the details recorded about activities were general, and aggregated. However, there were strong negative reactions to the incidental sharing of domestic information through the video conferencing display – which provided visual, temporal and restricted locational information about the home. The transfer of the display to a non-domestic context, such as school or a library, removed all these issues. Reactions to the recording of domestic information can therefore be seen as a subsection of reactions to the recording of personal information, with the home as an extension of the self [2]. Similarly, sharing of personal locational information as outlined in the mobile demo was not even considered outside the family.

A database that recorded activities was seen as a dangerous record, best used in times of prosecution, rather than to assisting in day-to-day life. Awareness of the educational usefulness of the technologies shown, while acknowledged as important could not overcome these concerns. Technology-based solutions to guarding domestic privacy such as security filters were rejected, and distrust extended even to rejecting access to traditionally trusted others, such as teachers. Simple controls were demanded, and seemed to be the best ways to assure families of safety.

**IMPLICATIONS**

We hope to have shown that the family is an important stakeholder in the design of school-related technologies for children, especially where these technologies are designed to be used in a domestic context. While a focus on children as the users of such technologies is informative, the family
shares certain values, and operates on highly nuanced understandings of trust. The way trust is negotiated may differ between families, and between cultures, but is likely be both as important and as nuanced for any such group.

A core issue for this and future research is the discussion of children’s privacy in technological design which our work suggests need to move beyond the world of ethics, and into the world of unwritten family rights, where the right of children to privacy is constantly negotiated and complex.

**Design**

There are also some implications for the design of home-school technologies that can be drawn from this work.

Implementing privacy in data collection devices for children within the domestic context has been highlighted as a core challenge for designers. We suggest that explicit controls that allow children or parents to switch on and off monitoring may well cause problems, by bringing the management of the rights of children into too strong a focus within the family. To solve this problem, while still able to configure such technologies to adapt to individual family needs, may require what Iachello et al. [7] call ‘slack space’. In this context, slack space refers to adding enough technological ambiguity to the device to deny access to monitoring in socially acceptable ways – by claiming the owner ‘forgot to switch it on’, or ‘ran out of batteries’, rather than having to explicitly state a wish to deny others access to the information, when the device is switched off.

We also need to consider how trust might be gained for sharing information with the world outside the family. For example, families demanded simple controls for the sharing of such data; this could include making the data that was travelling outside the family highly visible, and thus avoiding the feeling that the anonymous database was constantly under threat of access. An alternative, social solution to this problem might be to learn from the ways data sharing is accepted within the family, trying to create similar trust relationships between teachers and children.

**Educational policy and practice**

Finally, we hope to have established the family and the domestic environment as more than unquestioning recipients of educationally focused devices. Both policy makers at the governmental level, and practitioners such as teachers, must respect the fact that families may resist the use of context-sensitive devices, regardless of the benefits they provide. Making sure such technologies are configured in sympathetic ways, as suggested in our guidelines for design, might be one way to achieve this.

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**REFERENCES**


