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ORIGINAL ARTICLE

Building a BRIDGE between children and users: a socio-cultural approach to child–computer interaction

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Abstract The field of child–computer interaction has received growing attention as a result of the penetration of IT into children's everyday lives. Consequently, the involvement of children in the design of children's technology has been widely discussed. So far, literature on children's involvement in design has mainly treated design with children as a distinct design discipline regarding children as ''cognitive incomplete'' in comparison with adult users. With a point of departure in the framework of socio-cultural activity theory, this paper provides a new perspective on design with children, based on understanding children as participants in meaningful communities of practices. Thus, we argue that children could and should be involved in design on the same terms as adult users; children are treated as experts in their everyday lives and we cannot design future IT for children without involving these experts. The paper introduces the BRIDGE method including a palette of design techniques as a practice-based method for designing with children based on this perspective.

Keywords Socio-cultural activity theory · Design with children · BRIDGE method · Practice-based design

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1 Introduction

In the last decade, an increasing amount of attention has been paid to children as a special user group in system design, motivated by both the technological progress in non-professional and domestic settings as well as the alluring market potential in children's technology [e.g. McNeal (1999)]. Today, it is widely accepted to involve children in the process of designing new technology for children. Kids are experts in the way they live and their everyday lives, and this expertise is a keystone when designing meaningful artefacts for children. However, when it comes to discussing how children should be involved in the design process, the answer is far from clear.

Several research contributions discuss the role of children in the design process, e.g. as design partners (Druin 1999a, b), informants (Scaife et al. 1997; Scaife and Rogers 1999) or testers (Gilutz and Nielsen 2002). Common for much research in this field is the grounding of methods and techniques on Piaget's theory of children and learning, and building on an understanding that children are ''cognitive incomplete'' beings or ''human becomings'' (Lee 2001). In this context, we still see a need for discussing child–computer interaction (CCI) on a methodological level, specifically with respect to introducing an alternative view of children as ''human beings'' belonging to meaningful communities of practice and the consequences this has on how they may be involved in the design process. With this paper we introduce the BRIDGE method; a practise-based approach to CCI based on the socio-theoretical framework, and present three examples of concrete techniques based on this method that involve children in design as legitimate stakeholders on the same terms as any other group of (adult) participants. We argue that design with children is not a distinct design discipline. Rather, designing with

children can benefit from conventional participatory design (PD) as well as provide new insights to PD through the development of innovative design techniques.

1.1 A short note on terminology

As different definitions of *method* and *methodology* exist, we will specify how we use these terms and how they relate to BRIDGE and the research field in general. We employ Mathiassen's (1981) account of a design method to frame the notion of a design method. Mathiassen (1981) makes a distinction between method, tool, and technique in his work on theories and methods for system development[1]. According to Mathiassen, a design method has a limited *application area* in relation to who participates in the process, to the type of organizational and technological changes, or how they are implemented, and to the number of people involved in the process. For example, the MUST method is applied in commercial settings as a resource for professional IT-Designers to conduct investigations into organizations (Bødker et al. 2000, 2004), and the Cooperative Inquiry method is solely applied in design with children (Druin 1999a, b). A method also includes a particular *perspective* on phenomena (e.g. on the user organization and its need for new IT-artefacts) and a coherent set of *tools*, *techniques*, and *principles of organization*. A technique informs of how a design intervention can be conducted. Techniques such as Future Workshop (Kensing 1987) and Prompted Reflections (Kensing 1998) are part of the MUST method, whereas Technological Immersion (Boltman et al. 1998) and ''Mixing Ideas'' (Guha et al. 2004) are techniques applied in Cooperative Inquiry. A design technique makes use of different *tools*, and is developed to support the different activities in the techniques. The principles of organization inform how user participation is conducted and how the resources in the design process will be used.

Accordingly, we treat ''methodology'' as a body of methods which shares the same perspectives in design in spite of differences in application areas, tools, techniques, and principles of organization. PD is an example of a design methodology embracing a variety of different methods such as Cooperative Design (Greenbaum and Kyng 1991), the MUST method (Kensing 2003), Cooperative Inquiry (Druin 1999a) and Contextual Inquiry (Holzblatt and Jones 1993). Thus, for the purpose of clarity, we have chosen to refer to Cooperative Inquiry as a method rather than a methodology even though this is contrary to the terminology used in Druin (1999a, b).

[1] Mathiassen (1981) uses the notion of system development. In this chapter I will use the notion of design to develop an understanding of a method for designing with children.

2 Child–computer interaction

Today, child involvement, at some point in the design process, is accepted as an approach for gaining insight into the future use practice of children (Westerlund et al. 2001; Rogers et al. 2004; Druin et al. 2003; Bruckman and Bandlow 2002). As a result of the growing interest into design with and for children, the interaction design and children community emerged as an international conference in 2002 on interaction design in relation to children. The conference organizers drew heavily on the experiences from the ACM SIGCHI.kids events (e.g. Druin 1997–2003). The conference attracted a lot of attention from a range of disciplines such as human–computer interaction (HCI), Interaction Design, Educational studies, PD, Pedagogy, Developmental Psychology, and Computer Science with a shared focus on children as users (and producers) of technology. The research interest in designing with children is, to a high degree, driven by researchers with a background in PD, however these contributions all include a dissociation with conventional PD research propagating ''designing with children'' as a distinct design discipline. PD was originally concerned with interventions into workplace environments in which tasks were clearly defined (e.g. Bjerknes et al. 1987; Greenbaum and Kyng 1991). As technology penetrated the domestic and non-professional use practices, the need for a revised PD methodology for designing with children (as non-professional users) was claimed, of which the most prevalent within mainstream CCI research is Druin's (1999a, b) cooperative inquiry method. Cooperative inquiry emphasizes: (1) a multidisciplinary partnership with children; (2) field research that emphasizes understanding of context, activities, and artefacts and; (3) iterative low-tech and high-tech prototyping (Druin 1999b). Furthermore, the cooperative inquiry method contains a set of guidelines and techniques specially equipped for design collaboration with children (Druin 1999b). Druin keeps a close connection to PD and emphasizes a design-centred learning approach in contrast to, e.g. Soloway et al. (1994) whose learner-centred design method is based on pedagogical concerns. Soloway et al. (1994) emphasize both pedagogical, curricula and didactical aspects of the design process. Teachers as well as children are involved in the learner-centred design process. The approach is further developed by Kafai (1995) who treats games as a context for learning by placing children in the roles of producers rather than consumers of games. In Kafai and Resnick (1996), the learner-centred design approach is discussed with respect to the way design activities can provide personally meaningful contexts for learning. Scaife et al. (1997) provide an Informant Design method that treats children, teachers, researchers, and other stakeholders as

''native informants'', all contributing their particular expertise to iteratively develop new technology.

Our contribution to the methodological discussion is based on yet another shift in perspective, namely neither focused on learner-centred design nor design-centred learning, but on what we may call *practice-based design*. Practice-based design draws upon the socio-cultural activity theory (SCAT) framework Vygotsky (1978, 1998), Hedegård (1995, 2003), Leontjev (1978), Newman et al. (1989), and deploys the viewpoint that children participate in meaningful communities of practice, which is a valuable resource to be considered in the design process. In the following, we discuss what characterizes a SCAT based approach to CCI and present the BRIDGE method that builds upon it.

3 A socio-cultural based approach to CCI

Design with children is often treated as a special research field within the field of design and HCI (Bekker et al. 2003). Bruckman and Bandlow (2002) introduce the field of designing with children with an account of the Piagetean scheme theory emphasizing that children lack knowledge and experience and have fundamentally different experiences and understanding of the world compared to adults. Thus Bruckman and Bandlow (2002) list general differences between CCI and conventional HCI in relation to dexterity, speech, reading, background knowledge, and interaction styles (Bruckman and Bandlow 2002, pp. 8–12). This basic assumption of child incompleteness is also found in the ''Cooperative Inquiry'' method (Druin 1999a, b). Druin argues that children (as opposed to adult users) do not have a defined task and their activities are *''...open-ended and exploratory''* as opposed to professional practices (Druin 1999a, b, p. 52). Children, according to Druin *''... have their own likes, dislikes, curiosities and needs that are not the same as their parents or teachers''* (Druin 2002) and she pinpoints that children are not just short adults but *''...an entirely different user population with their own culture, norms and complexity''*. (Druin 2002, p. 1). According to Druin (1999b) these differences legitimize a dedicated design method embracing the design with children. This approach is presented and discussed further in Markopoulos and Bekker (2003).

The theoretical foundation for understanding children and childhood is primarily adapted from developmental psychology. Within developmental psychology an emphasis is put on the cognitive and physical development as individuals develop from infants to adults. Piaget [Markopoulos and Bekker 2003] argues that children (as opposed to adults) lack basic knowledge and experiences and divides children's cognitive development into a series of stages in which children develop into adulthood (Piaget 1970). According to the work of Piaget (e.g. 1970) and Erikson (1971), children are in a cognitive developmental process in which cognitive skills are accommodated and assimilated in the process that leads to the ultimate goal of adulthood. An alternative view presented by Vygotsky (1978) and Leontjev (1978) acknowledges the work of Piaget but voices the need for a more socio-cultural frame for understanding children's development. According to Leontjev (1978), personal development takes place through participation in social practice and is dependent on the condition these practices give for a person's participation in specific activities. Different phases in children's development can be related to the qualitative changes in institutional practice (El'konin 1972; Hedegård 1995). Leontjev (1978) introduces the notion of appropriation to emphasize the social nature of children's development and learning. According to Leontjev, the child's appropriation of culturally devised tools comes about through involvement in culturally organized activities in which the tool plays a role (as described in Newman et al. 1989). Leontjev (1978) treats human development primary driven by the social and cultural expectations to the individual, when engaged in cultural practices.

Thus, with this point of departure, we embrace a focus on children as technically competent, resourceful partners with a distinct social practice, able to make key decisions in the design process on the same terms as any other stakeholders. A similar view can be found in Downes (1999), arguing that it is of vital importance to move away from the socially constructed bias of *immaturity*, which promotes a view of children *''in the future voice as adults in preparation, in passive voice as recipients of adults' attention and treatment or as objects of structural determinations''* (Downes 1999, p. 334) for them to be able to participate in the design process as ''authentic stakeholders'' rather than informants. This corresponds well to the argument made by Lee (2001) that promotes a view of children as ''human beings'' rather than cognitive incomplete ''human becomings''. We agree with the standpoint presented in Downes (1999): *''For children to be identified and engaged in this process as stakeholders, both evaluators and other stakeholders must put aside their assumptions of superiority based on age and cognitive maturity. This is not to say that a differential does not exist, but that regardless of differences, all stakeholders are accorded the rights to participate fully in the negotiation process''*. (Downes 1999, p. 337). Downes (1999) promotes a view of children as a minority group with similar power relations (or lack of same) to the other stakeholders and with reference to Mandell (2001) argues that *''once the adult assumption of superiority based on age and cognitive maturity is put*

aside, evaluators can build on the techniques that field workers long ago developed to reduce social distance.'' (Mandell 2001, pp. 337–338). Thus, from this perspective there is no reason why children should not be admitted into the design process as *authentic stakeholders* and be seen as a resource in design on equal terms with any other partner. A common argument against seeing children as equal partners in design is that children cannot be experts in something they have not yet learned. However, that is a general concern: surgeons cannot participate in the design process as engineers, nurses cannot be experts in waste water treatment, and, even though we have all been young, researchers and teachers cannot be experts in being children attending school today. Paying attention to power relations and focusing on children's practices is also supported by Robbins (2005), who emphasizes the need for considering e.g. contexts, collaboration and cultural tools in relation to how children think. Issues that need careful consideration when doing research with young children include a focus on the relationship between how children learn and develop and: ''*...participation in particular contexts, with their own practices, traditions, philosophies, histories, values, belief systems, artefacts, and ''ways of behaving''*'' (Robbins 2005, p. 144). This moves beyond the focus of ''*chronological age and developmental milestones*'' (Robbins 2005, p. 140) and promotes a view similar to ours of children as ''thinking, learning, developing, and changing *through participation in the socio-cultural activities of their communities*'' (Robbins 2005, p. 147, original emphasis).

In the following, we present the BRIDGE method in more detail and explain how this perspective on children as *authentic stakeholders* in the design process helps us draw upon traditional techniques for user involvement in design as well as creates new techniques that are generally applicable in PD.

4 The BRIDGE method

The understanding of children and their role in design based on the socio-cultural theoretical framework provide the foundation for the BRIDGE (*Danish: BRuger Involvering i Design, GEntænkt – English: User Involvement in Design, Revised*) method. We see the BRIDGE method as a theoretically grounded *bridge* between research contributions from HCI/PD and CCI that provide a common ground for understanding and expanding the research field to the mutual benefit of both research areas. In the following, we give a brief characteristic of the core elements of the BRIDGE method.

The BRIDGE method is defined by:

– Children's participation in meaningful communities of practice rather than focusing on any cognitive differences between arbitrary age groups.

Rather than seeing children as cognitive incomplete ''human becomings'', we need to create a design space that allows children to contribute to the design on the same terms as any other group of participants.

– Designing new technology for a community of practice requires the active participation of members of the practice in the design process

Based on our background in PD, we firmly believe that good design cannot be achieved without a serious involvement of teachers and pupils, who are the experts of use when we deal with teaching and learning in schools. In particular, children are experts in their everyday lives and constitute as valuable a resource in design as any other stakeholder in this process. Thus, being socio-culturally based, a core issue in the BRIDGE method is that it treats children as living their lives in meaningful socio-cultural dependant practices. These practices can and should (in line with work practices) be the starting point for design, and the design process must allow the children to participate as *authentic stakeholders*.

– Engaging children in design requires legitimate access to their practice

Design is the process of mutual learning between the several different practices belonging to the stakeholders in the design process, e.g. the children's practice and the designers' practice. For mutual learning to occur successfully, *legitimate* access to each other's practices must be an integrated part of the design process. By legitimate we refer to the fact that design interventions must create a meaningful frame that reflects the cultural expectations belonging to the children's everyday lives. The design techniques embody and prescribe the conditions for the meeting of designers' and children's practices. Hence, the BRIDGE method and the design techniques must build upon legitimacy.

It is important to understand that we do not see design with children as a symmetrical relationship. Specifically, we consider it the responsibility of the designers: to choose the appropriate tools and techniques for the task at hand; to understand the children's practice; to confront the children's present practice with new technological options with the aim of supporting the process of shaping new visions of design and use; and to develop their own practice as an integrated part of the design process. This is reflected in the BRIDGE method through the main domains of discourse when designing with children consists of: children's present practice; the new IT-artefact being designed; technological options; and the designers' present practice. We position the

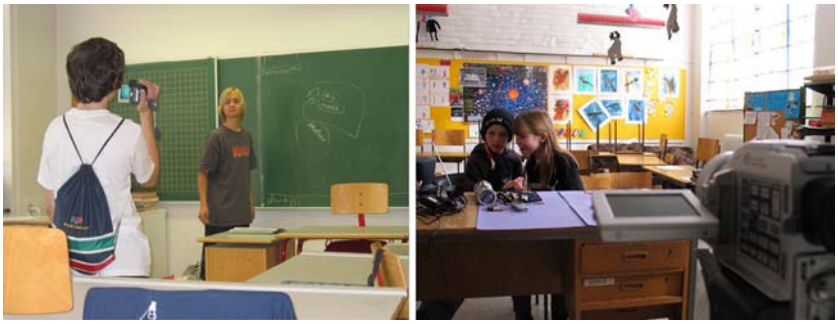

Fig. 1 Using video in design with children: documenting children's practice

BRIDGE method as a part of the PD methodology, sharing general perspectives with PD. Accordingly, we treat user involvement as a key factor in design, however, with its basis on SCAT our primary focus becomes designing for children as belonging to a social practice rather than designing for children as cognitive incomplete beings, the latter as seen in main contributions within CCI research. For a more detailed description and a thorough discussion of the BRIDGE method, see Iversen (2005).

4.1 Applying the BRIDGE method to CCI: an example

A core consequence of applying the BRIDGE method to the area of CCI is exemplified in the discussion of whether and how we may use video in the design process depending on whether the users are children or adults.

Within PD, research efforts have revealed the potential of using video recordings in user participation (Mackay 1995; Buur and Bødker 2000). Video is used for documenting user trials, test scenarios and workshops, and in later years video has also been more widely acknowledged as part of the ethnographically inspired inquiry into user contexts (Buur et al. 2000; Binder 1999; Sperschneider and Bagger 2003; Mackay 1999; Mackay et al. 2000). Video documentary on work practices appears to most designers as a valuable input to the design process. Lately, Pedersen and Buur (1999), Buur et al. (2000), Buur and Binder (2001) explore the potential of video recordings as design material. Design material is in this sense ''*... stories created by users and designers to frame the design problem and to establish new design solutions*'' (Buur and Binder 2001, p. 821) (Fig. 1).

However, the use of video recordings when designing with children is widely discussed (e.g. in Druin 1999b; Bruckman and Bandlow 2002). The question is whether children respond to the use of video camera in design and to which extent the video camera interferes with the design process. Iversen (2002) argues that children *do* respond to the video camera—just as adult users do—and states that children are very explicit about their relation to the presence of a video camera. They make funny faces; try to get in front of the camera, etc. However, when designing with adult users (operators, engineers, teachers, etc.) they perform in front of the camera too. Meta statements are uttered according to individual strategies. Adults move to one or the other side to be out of the camera range when uttering a ''private'' statement to other participants, etc. The discrepancy between the assumptions in the Cooperative Inquiry method and the PD approach can be exemplified by seeing the video camera as a design artefact. In PD, the video camera is treated as a mediating ''why'' artefact in the design collaboration activity (Engeström 1987). The video camera captures why the collaborative process is initiated, namely to provide empirical input for designing meaningful artefacts. When participants respond to the presence of the video camera, they relate to the premises of the design activity. Grown-ups extend the physical room with ''meta'' statements that are intended to travel on through time and space and finally meet their recipient. In the same way, children respond to the framework of the design activity by performing or freezing in front of the camera. By responding to the camera both children and grown-ups relate to the activity system of design collaboration. They relate to an activity system that is different from their existing practice. By accepting that the activity, in which collaboration between designers and users occurs, *is* different to the users' existing practice, the users act normally in the situation in which a camera is present.

Thus, we argue that the field of designing with children can benefit from using video as design material when involving children as participants in the design process, and use video extensively throughout the techniques presented below. The example of video use in CCI is further discussed in Iversen (2002).

5 BRIDGE techniques for designing with children: three examples

The BRIDGE method is developed over a 5-year period within two consecutive research projects[2] with the overall

[2] The NetWorking.Kids project (project page: www.networkingkids.dk) and the iSchool project (project page: www.interactivespaces.net)

aim of developing an open and ''fluent'' information technology with sufficient accessibility and robustness to support learning in and outside the physical limits of the school. The progression of the research projects is characterized by a continuous interchange between the development of design methods and new concepts of IT (prototypes) for school environments, and the transfer of knowledge between these two areas. The IT concepts include a digital schoolbag (see Brodersen et al. 2005), a temporary learning niche (Brodersen and Iversen 2005), and a context-based, mobile learning system (Bouvin et al. 2003, 2005), two of which are currently being developed for commercial sale.

Within this experimental, theoretically based context we have operationalized the BRIDGE method into a palette of techniques (Iversen 2005). In the following, we present three of these techniques that deal with different aspects of CCI and are derived from the different, related research areas or directly from the BRIDGE method: a PD-based video prototyping technique applied in CCI; CCI-based technological immersion modified to the BRIDGE method; and a novel BRIDGE technique—fictional inquiry in a shared narrative space.

5.1 Video prototyping with children: applying participatory design techniques in CCI

The potential of Video prototypes is well documented within PD. Vertelney (1989) suggests a ''stop-motion'' technique for designers to video prototype the appearance and dynamics of a user interface. Young (1992) developed this technique by emphasizing user participation in the creation of the video prototype. Sato and Salvador (1999) used acted-out dramas in a focus-group like setting. Inspired by the work of Binder (1999), Pedersen and Buur (1999) describes how video prototyping with users propose new work practices and new technologies. Mackay et al. (2000) used the Video Prototyping technique for the process of videotaping the use of physical prototyping material (paper, transparencies, Post-it notes) when acting out an interaction idea as part of a design process. In their experience, this technique produced very detailed outcome—a shared design artefact, which could be directly implemented in a software prototype. Their general assumption is that videotaped design ideas are more likely to influence later design activities. Ylirisku (2004) describes how participatory video scenarios can be used to facilitate user participation in the development of collaborative information systems. Ylirisku (2004) emphasizes that co-creating video scenarios in participation with users are at the best both efficient and motivating.

We present two cases where video prototyping was used in the iSchool project to engage children actively in the design process by generating and visualizing ideas about future use of technology.

5.1.1 Case: blue Monday in 2010

At a ''Video Prototyping'' workshop, the pupils were divided into groups of 4. Each group was encouraged to visualize an immediately upcoming *social* event: the day following their confirmation, also known as Blue Monday where they go out with friends to the fun fair or go to a party to celebrate this quasi-ritual ''coming into'' adulthood. The pupils visualized the chain of events on a preprinted storyboard. The groups presented the work in plenum to get feedback from their classmates. Afterwards, the groups were asked to redo the storyboard by imagining that the illustrated chain of events would take place in the year 2010. We used small movie sequences to initiate a group discussion about future technology and future living before working on the future storyboard. Again, the groups presented their storyboard in plenum. Finally, the groups were encouraged to dramatize the storyboard (or fragments of the storyboard). Props were produced from cardboard, and existing IT gadgets were revised to fit in the scenery. The storyboards of the future scenarios were video recorded and finally presented in plenum in a cinema-like setting. The pupils themselves directed and produced the video prototypes assisted by designers and teachers.

5.1.2 Case: context dependent information services

A similar video prototyping workshop was later conducted with 12 students from three different schools to

Fig. 2 Video prototyping: envisioning future technology with children

brainstorm with the children about different, interesting types of context dependent information on mobile devices (Fig. 2).

In both cases, the video prototypes helped the designers and children collaboratively envision future technologies driven by the children's imagination and expectations of the technological possibilities. The content of the assignment became *legitimate* to the children because it was based on actual events in their lives and *legitimate* to the researchers because it focused on developing future technologies. This is an example of how ''traditional'' PD techniques can cross the boundaries into CCI and provide valuable insights into children's practice.

5.2 Technological immersion with children: drawing on an existing CCI technique

The Probing Practice technique provides a workshop setting for inquiry into the children's *appropriation of new technology* in their *existing school practice*. As argued above, the BRIDGE method treats children's present practice as the outset for design. The visions for change and thereby the visions of a new IT-artefact are inherent in children's present practice. By providing technological options to children's present practice, the Probing Practice technique can crystallize these visions for change and thereby contribute to the design of new IT-artefacts.

The Probing Practice technique is a continuation of the research into Technology Immersion. Technology immersion is a technique for observing what children do when exposed to extraordinary amounts of technology [Boltman et al. (1998); Druin (1999a, b)]. The technique was developed as a part of the ACM SIGCHI's annual CHI conferences in which children exposed to a large amount of technology were able to produce a conference newsletter and website in the CHIkids Newsroom (Boltman et al. (1998). A key aspect of the Technological Immersion is that children themselves are the decision makers in the technology-rich environment provided by designers. Exposed to a large amount of technology, children choose what they like and do not like and thereby provide designers an opportunity to get first-hand insight into children's account of technological options. Technology Immersion is also the inspiration of the ''KidsReporter'' technique as developed by Bekker et al. (2003). In the KidsReporter children act as reporters and photographers in school assignments in a technology enhanced Zoo. The KidsReporter technique evaluates new technology according to its ability to support educational IT in defined settings such as the Zoo.

5.2.1 *Case: NetWorking. News—probing school practice with mobile devices*

In the NetWorking.Kids project we wanted to investigate the potential of mobile technology to support field trips and project assignments in educational settings. We wanted to discover how children in their existing school environment would appropriate the mobile technology. A workshop session depending on the Probing Practice was conducted at a local school and repeated five additional times in different school settings. We named this probing inquiry into mobile technology in school environments ''NetWorking.News'' (see Nørregaard et al. (2003) for a detailed account of the NetWorking.News sessions) (Fig. 3).

The NetWorking.News session was a time-intensive workshop (usually 3 hours) where a class of 7th graders was asked to produce a web-based news site by means of the technology that we provided. An editorial group located in the classroom edited the news site and coordinated the work of three to four groups of reporters in the field, aided by their teachers and two researchers. The content of the news site was initially discussed at an editorial meeting where the children chose which stories to include. The reporter groups were sent out into the school campus and into the immediate neighbourhood to cover the stories, followed by a researcher with a video camera to document their efforts. The reporters could communicate with the editorial group in the classroom by means of the technology provided. In each of the six NetWorking.News sessions, the children succeeded in the process of producing a news website covering a diverse set of areas ranging from the war in Iraq, local sports, fashion, exit polls on an election, and music and films. The website produced by the children was published on the Internet with links from the school's own website. At the end of the day we debriefed the session with both teachers and children in a plenum session.

We documented each of the five NetWorking.News sessions on video tape and conducted video analysis inspired by the Video Analysis Labs (Jordan and Henderson 1994) on selected episodes of the video material.

The technology immersion technique let the children experiment with new technology in a school setting and thus framed the session with respect to their present practice. They were active producers of content for the news site. Thus, the NetWorking News sessions exemplified that we may share techniques and tools from the existing CCI toolbox. However, the application of the techniques differ significantly according to our theoretical point of departure; we introduce the technology into the children's (and teachers) existing practice aiming at getting access to their situated appropriation of technology.

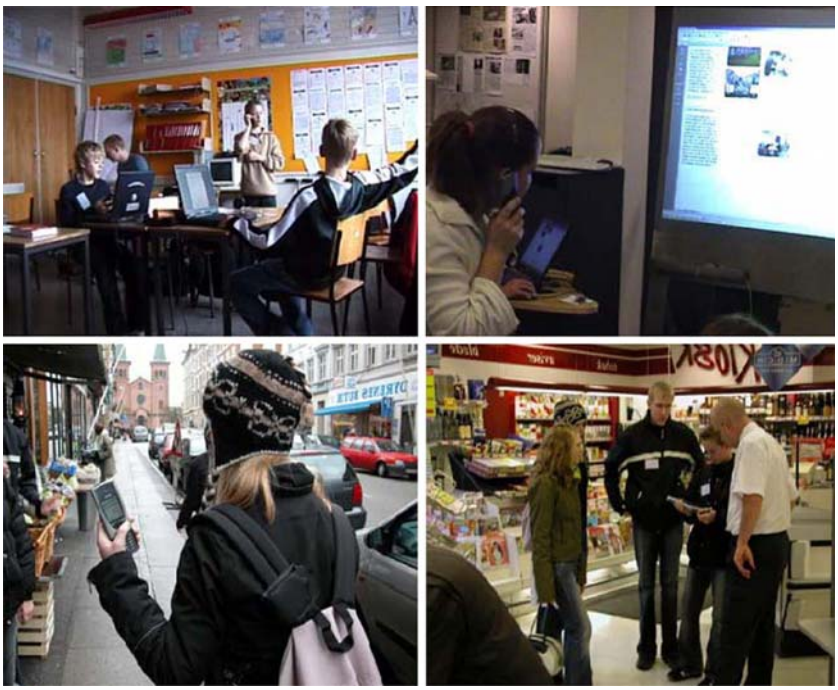

Fig. 3 The editorial group and reporters in the field hard at work

5.3 Developing a BRIDGE technique: fictional inquiry in a shared narrative space

Creating a shared narrative space is a way to gain insight into children's present practice through role-play. The *fictional* shared space of a role-play temporarily short-cuts existing norms, values and power relations in the design collaboration between designers and children. This provides the designers with an opportunity to ask questions that would otherwise be considered odd and exposes the children to the structure of their present practice. The basic premise is to establish a shared narrative space between the designers' and children's practices in which both children and designers gain access to the existing use practice.

The technique is inspired by current discussions within PD emphasizing an ''in-between'' space for design collaboration [e.g. (Muller 2003)]. Robins (1999) states that there are basically two spaces, or in Muller's (2003) terminology: *sitings*, in which PD occurs: either the designers enter the world of the users; or the users are invited to the design laboratory. Pedersen and Buur (1999) offer an account of the importance of where the design interventions take place. When choosing the designers' turf as *siting* for design intervention, designers generally learn from hearing the users exchange practice experiences. On the designers' turf, users tend to take a more general view of things (Pedersen and Buur 1999). When choosing the users' turf, the conversations are grounded in more concrete and specific practice experiences. The users generally tend to feel more at ease in their home environment. This binary choice of *sitings* is questioned by Muller (2003), proposing a *third space* of PD in between the world of the designers and the users.

In order to gain access and insight into the everyday life of children, several techniques have already been developed. Oosterholt et al. (1996) propagate the use of Photo Diaries as a way to gain access to children's practice in the process of designing children's technology. This technique is further developed by Hutchinson et al. (2003) who suggest the use of technology probes as a way to comprehend the needs and desires of users in a real-world setting. Bekker et al. (2003) offer the ''KidsReporter'' technique as a way for children to contribute to a design problem through the making of a newspaper with the children's ideas about a certain topic. NetWorking.News provides a similar framework in which children's use of mobile technology is investigated and reported during a 3-hour workshop. Both the KidsReporter and the NetWorking.News techniques provide a framework for gathering user requirements in the geographical and social context of the children. Both techniques establish inspiring social settings in which children are encouraged to participate and thereby expose their practice and especially their use of technology for designers. These techniques are useful, when conducting open-ended research into children's practice. However, neither of the techniques provide a framework for questioning specific user requirements according to elements in children's practices and none of them consider the siting of the design intervention.

Fig. 4 Fictional inquiry in a shared narrative space

The Mission from Mars technique was developed in the iSchool project where we experimented with a software infrastructure in which pupils could access their digital school material by using BlueTooth technology. The basic idea was to provide children with access to digital material with a seamless login and thereby provide the pupil access to their digital ''eBag'' as easily as they access their physical school bag. However, the design of the eBag demanded a detailed understanding of the physical schoolbag. ''Mission from Mars'' was initiated to understand the children's use and understanding of the schoolbag. The shared narrative space was established so we could ask questions according to the children's existing school bag. The Mission from Mars sessions are accounted for in Dindler et al. (2005). The eBag is further described in Brodersen et al. (2005).

5.3.1 Case: mission from mars

Twelve 5th graders were invited to participate in the 3-hour ''Mission from Mars'' session. In the introduction, a session facilitator revealed the plot of the event: By means of high-tech equipment, contact had been made to a space mission from Mars. A text document was handed out to the children containing a ''Martian'' message such as: *''H&#all¤%o E''#¤arth; H!''ow A#)()re y¤o{u?* '' [Hallo Earth, How are you]. The children were encouraged to interpret the Martian message. In the text document it was revealed that a Martian was conducting a study of ''parental care''. The Martian wanted to identify how human beings become educated and skilled citizens. Therefore, the Martian kindly asked the pupils to prepare a live broadcast from their classroom to her visiting space shuttle in outer space. The children were encouraged to tell about their everyday lives with special focus on their everyday artefacts. The transmission was established through a software ''translator'' that translated ''Martian'' to a language close to the children's mother tongue (in this case Swedish[3]) (Fig. 4).

The session set-up was established in two locations. The children were situated in the classroom in front of a video camera that recorded the event and sent picture and sound to a location nearby. In this location, a researcher (the Martian) was located. A wireless microphone transmitted the messages to loud-speakers in the children's classroom. The children talked to the Martian in small groups.

The Martian asked the children to explain the contents of their school bags, the information hidden in the different pockets in the school bag, etc. In this way, the Mission from Mars intervention informed the design process with detailed descriptions of the children's school bag. The shared fictional narrative space legitimized the asking of stupid or obvious questions like ''what is a school bag?'' because the children were playing along with the story of talking to an extra terrestrial being who was not part of their culture, and this let them reflect on what they were carrying and how they structured the contents of the bag. Thus, the narrative space created in this setting helped us suspend the norms, cultural values and expectations that would otherwise be present in, e.g. an open-ended interview. The shared narrative space is a powerful technique for addressing core values deeply embedded in a culture, e.g. revealing tacit knowledge within a practice, by creating a context in which the usual becomes unusual. Hence, the shared narrative space technique shows potential for informing design in a greater PD context by offering a general framework for playing with conventions in a temporary, *legitimate* space. The premise for the success of this technique lies within the creation of the shared narrative space, employing props and the right framing to allow the participants to suspend disbelief, thus having a broad application area. This technique has recently been used very successfully with groups of teachers, administrators and architects participating in a series of ''Olympic sports events'' as a part of investigating into kinesthetic learning tools (Grønbæk et. al., in press).

6 Conclusion and future work

This paper introduces the BRIDGE method; a practise-based approach to CCI based on the SCAT framework. We presented three examples of concrete techniques based on the BRIDGE method that all involve children in design as legitimate stakeholders rather than considering them

[3] The Swedish language is close to Danish. However, the Danish pupils in the MiM session had some difficulties understanding the ''Martian'' properly.

''human-becomings'' with the need of a special method to guide their participation in design. We see the BRIDGE method as a very promising supplement to the existing CCI methodologies and as a step towards bridging the research efforts in CCI and PD. The BRIDGE method acknowledges children as participants in meaningful communities of practice, and it may use many of the techniques developed within conventional PD as well as create new techniques to inform PD in general.

Despite our differences in perspective, we fully acknowledge the great work done by the CCI research community to bring focus on bringing children into the design process, an effort without which children would still not have a voice in the development of technology specifically targeted at them as a user group. Through the examples of concrete techniques based on the BRIDGE PD method, we show that existing CCI techniques are both valuable and meaningful within the BRIDGE framework even through they are created from another methodological background. We share our emerging design method to invite other designers and researchers to participate in establishing and developing the BRIDGE method further.

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