# Children's Participation in Constructing the Future School:
## A Study of a Large-Scale Effort Involving ICT

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## ABSTRACT

*Children are active technology users. Still, a literature review reveals that they are not positioned in a very strong role in large-scale efforts involving information and communication technology (ICT) development. Information systems (IS) literature hardly mentions children in connection to ICT. The authors have examined how children have participated in the development of a 'future school' in a large-scale ICT development effort, involving also developments in the domains of pedagogy, architecture and interior design. They identified three established roles for children: the user, the informant and the tester. In addition, the authors identified traces of children's more genuine participation, hardly addressed in the IS literature but discussed extensively within other disciplines. Therefore, the authors offer a broadened conception of what 'participation' may entail for the IS community. They argue that large-scale efforts of this kind would benefit from more active participation by children as it has been acknowledged that children's participation may lead to improved decision-making.*

*Keywords:   Active Technology, Children, Children's Role Participation, Future School, Information Communication and Technology*

## 1. INTRODUCTION

This paper explores children's participation in a large-scale information and communication technology (ICT) development effort. User participation in ICT development has a long

tradition within the fields of Information Systems (IS), Human Computer Interaction (HCI) and Participatory Design (PD). However, even though children are an active group of technology users, IS literature seldom views them as users of ICT or participants in the ICT development process. The few IS articles that refer to children see them merely as stakeholders,

somehow affected by ICT rather than using it themselves or being connected to its development in any way. In HCI and PD research, on the other hand, children's ICT use and their participation in ICT development are more prominent themes. Even a conference series of Interaction Design and Children (IDC) exists.

However, a review of IDC articles, focusing on large-scale efforts involving ICT revealed that even in these efforts the role of children is not very strong.

However, children's right to participate in decision-making that affects them is recognized in the widely ratified UNICEF Convention on the Rights of the Child. A strong discourse in the disciplines of psychology and sociology among others also advocates children's 'genuine' participation. Within these fields, research has been conducted in many other contexts than ICT development, e.g., in local environment planning and design with active interest in involving children in such processes. It has been acknowledged that children's participation may lead to better decision-making as children's interests, concerns, and needs may differ from those of the adults (Ackerman, Feeny, Hart, & Newman, 2003).

The IS field has not yet taken into account children's right to participate and have their say in decision-making. This paper, however, wishes to contribute to filling this gap. HCI research related to children's participation has already introduced certain roles for children in ICT development. This study provides a further perspective in the context of a long-lasting, multiparty ICT development effort, which is large also in relation to its geographical scope and user population[1]. The paper further stresses the importance of enabling children's 'genuine' participation. Even though genuine or authentic participation has been called for and tokenistic participation criticized already in the existing IS research (see e.g., Howcroft & Wilson, 2003; Mumford, 1983), researchers have not so far touched upon this issue in connection with children and ICT development.

This paper has its focus on children's participation in a large-scale ICT development effort related to the 'future school,' involving also developments in the domains of pedagogy, architecture and interior design. The effort, ongoing since 2007, concerns an educational network of a Finnish city (local schools and the municipal educational administration). In the effort, the primary focus has been on the development of the concept of the 'future school'. In the spring of 2007, the city invited applications for development projects from schools in the district. In the invitation, the actors in the schools – teachers and headmasters – were encouraged to participate in developing school culture and in finding the best practices in pedagogy and technology use for the 'school of the 21st century,' i.e., the 'future school.' Ten of the city schools were selected to take part in the 'future school' development effort as 'Smart Schools,' pilots in technology use and renewal of pedagogic practices. Another future pilot school, an 'Integrated Pilot School,' was under construction in a new urban housing area at the time of the study. The school was to be built as part of a multipurpose centre that also included a library, a nursery school as well as other facilities and services for citizens. Experiences of the best practices from the conducted pilot projects were to be exploited in the Integrated Pilot School, in the existing and future schools of the city network, and elsewhere in the country. According to the statistics from September 20th, 2009, there were 42 comprehensive schools in the city with 12 258 pupils altogether. Out of these, 3068 pupils studied in the ten Smart Schools.

Not only have the educational authorities of the city and the persons responsible for the prospective 'future school' been active in the effort, but also the school staff members and school children. For example, school children have been given opportunities to contribute to shaping their own learning environments in their schools through their representatives. Having entered the scene later we had no opportunity of contributing to the school children's participation through a research intervention. Instead, the importance of children's involvement, catering for their needs and drawing upon their compe-

tencies has been emphasized in the case independently of our research interests, evidenced in the public documentation concerning this case among others. The research data also show how fostering children's wellbeing and participation in society are brought up as motivations for enabling school children to participate in the planning and decision-making concerning school activities. Furthermore, enabling school children to shape their own learning environments in their schools seems to be considered as training of their participation skills. It is also seen to foster co-operation between children as well as their sense of community.

Inspired by the calls for children's genuine participation, by the rich and complex empirical setting available as well as by the evident lack of research on children's participation in the IS field, we made an in-depth analysis of the case to inquire how children have been allowed to take part and to influence the solutions in the effort. This emergence of children's participation in the interview material has been analyzed through discourse analysis. The study has been guided by the research framework of Nexus Analysis (Scollon & Scollon, 2004), which allows extending the discourse perspective from micro level to organizational and institutional levels of social analysis.

In the following section, related research on children's participation will be reviewed, firstly, within the HCI and PD research fields, and, secondly, within the fields of environmental and urban planning. The third section introduces the theoretical and methodological background for the study. The results of our empirical analysis are then outlined and discussed. The final section summarizes the results and limitations and outlines paths for future work.

## 2. CHILDREN'S PARTICIPATION IN ICT DEVELOPMENT

User participation is a traditional topic of study in IS research, but it continues to be a vibrant theme, particularly due to the new, challenging IS contexts that pose novel challenges for user participation (Marcus & Mao, 2004). In general, user participation is deemed as important in IS research since it is expected to create buy-in among users, to improve system quality and to improve the relationships among developers and users (Marcus & Mao, 2004). However, as Howcroft and Wilson (2003) have argued, research has shown very mixed connections between user participation and systems success. The involvement of the users in the systems development projects may only remain symbolic tokenism where users are not given influential roles or real possibilities to affect decision-making (Howcroft & Wilson, 2003). Howcroft and Wilson (2003) critically remark that participation may be framed as a managerial approach not challenging the power relations within the systems development projects.

Another research field within which user participation has been of great interest and power related aspects in focus is PD, an approach towards computer systems design in which people destined to use the computer system play a critical role in its design (Schuler & Namioka, 1993). The tradition of PD originally focused especially on worker participation in systems development having its roots in Scandinavian Cooperative Design practices (Greenbaum & Kyng, 1991) and research projects on user participation on computer systems development (see articles in Bjerknes, Ehn, & Kyng, 1987). The PD approach focuses on the politics of design having roots in the industrial democracy in modern workplaces (e.g., Kensing & Blomberg, 1998) and addresses the political aspect of the design process (Bødker, Grønbæk, & Kyng, 1993). Cooperative design practices (e.g., Bødker et al., 1993), especially, have addressed the importance of training and active cooperation for full participation. To achieve democracy, techniques allowing increased use of users' everyday experiences and professional skills in design have been preferred instead of abstract professional system design methods.

Researchers have later extended PD also to new design contexts, e.g., with children. Druin (2002) has concentrated particularly on research on children and technology, distinguishing four

main roles that children have played in the technology design process: user, tester, informant, and design partner. Researchers may assign children the user role in trying to understand the impact of existing technologies on child users, and, consequently, to change future technologies or enhance future educational environments. Children may also participate in the informant role during the various stages of the design process, starting from the preliminary phase before any technology has been developed to the phase where the technology development has been completed. Children may also be involved as testers of prototypes of technology that have not yet been released to the world. In the role of design partner, children are considered to be equal stakeholders in the design of new technologies (Druin, 2002.)

Next, we will take a look at the studies on children's participation in large-scale ICT efforts, focusing on their stance on children's roles. In addition, we will review research conducted in the context of local environment planning and design, where children's genuine participation has been discussed.

## 2.1. Studies on Children's Participation in Large-Scale ICT Efforts

In many of the reviewed IDC articles addressing children's participation in large-scale ICT efforts, children are positioned as users of ICT (cf. Druin, 2002). For example, in a project in Italy, thousands of pupils were involved in producing digital narratives (Di Blas, Paolini, & Sabiescu, 2010). Children were also positioned as computer users along with adults in a German study on intercultural and -generational computer clubs (Weibert & Schubert, 2010). Sawhney (2009) describes digital storytelling as a way to empower young people in Palestinian refugee camps, in which, during a three-year program of creative workshops, videos were produced by the youth. Other reviewed articles have also brought up the social inclusion and empowerment of marginalized youngsters. For example, a study on a British project examin-

ing the social benefits of ICT for marginalized social groups focused on youth-led innovations with ICT and fostering engagement through digital creativity (Gaye, Tanaka, Richardson, & Jo, 2010). Di Blas and Poggi (2008) describe their experiences during a six-year effort during which educational programs based on 3D virtual worlds were experimented with over 9000 students from 20 countries with some evidence that ICT enabled social inclusion. Finally, Decortis and Lentini (2008) examined social inclusion in workshops organized in Belgium in which people jointly told stories with the help of photographing. In all these studies, children were positioned as users of ICT.

In other articles, the numbers of children involved or the settings themselves are not very large or wide-ranging. What is interesting, nevertheless, is the number of partners involved in the development process, including children taking part in one way or another. Cuthbertson, Hatton, Minyard, Piver, Todd, and Birchfield (2007) present a program on mediated education in creative arts, in its development the researchers, an elementary school and a community arts organization working together. ICT solutions were experimented with and refined, children being positioned as testers of new ICT (cf. Druin, 2002). Eriksson and Lykke-Olesen (2007) describe an interactive library project including partners with interest in design, research, industry and libraries, as well as children. Field studies in children's libraries were carried out and prototypes were evaluated with children (Eriksson & Lykke-Olesen, 2007). Children acted both as informants and testers (cf. Druin, 2002) as was the case also in the article by Antle (2003), which outlines a Canadian case on an online collaborative storytelling environment, the development involving 95 children. Field research and user-centred and informant design methods were used, e.g., information gathering related to children and their favourite websites and games, usability testing and field evaluations (Antle, 2003). In a large-scale HIV and AIDS counselling project in Tanzania, students took part in ICT development through interviews, telling their stories and producing

graphics and multimedia for the system. In addition, the system was tested with the students and, based on the feedback, some refinements were made (Duveskog, Kemppainen, Bednarik, & Sutinen, 2009). Finally, Williams, Jones, and Fleuriot (2003) enabled children's involvement in ICT development in a Mobile Bristol project, an effort between an ICT company, a university and a studio. They organized a workshop in which children experimented with ICT to create soundscapes. The authors mention, however, that children were mainly positioned as creative users and as informants articulating potential uses of the technology in question, while their role as design partners (cf. Druin, 2002) was not fully realized (Williams et al., 2003).

The PD research tradition is famous for its emphasis on the importance and the right of users to take part in the design of technologies that affect their life. However, it seems that in PD research, traditionally, the inclusion of children has not been an issue as such. Instead, when visible, the role of the child has rather been that of a potential user of some specific new ICT artefact (e.g., Weiss, Wurhofer, Bernhaupt, Beck, & Tscheligi, 2003), or of a family member (e.g., Kanstrup, Bertelsen, Glasemann, & Boye, 2008). In the case of community computing, children participated just as any other participants during community workshops in the neighbourhood networks projects (DiSalvo, Nourbakhsh, Holstius, Akin, & Louw, 2008). Although some research in PD has been conducted in relation to considerably extensive community communication and collaboration systems (e.g., Merkel, Xiao, Farooq, Ganoe, Lee, Carroll, & Rosson, 2004), contemporary PD research is mostly focused on rather small-scale ICT design efforts (Oostveen & van den Besselaar, 2004). Neither is there such PD research available with children involved. The research program on health information systems in developing countries by Puri, Byrne, Nhampossa, and Quraishi (2004) could be considered as an example of such research, one of their cases concerning the development of a community-based child health Information System. However, when creating a common

vision for the development of the children, the children themselves were not considered key players among community health workers, parents, teachers, caretakers and social workers. Children were only involved during feedback evaluation sessions (Puri et al., 2004). Yet, compared to more traditional PD projects, these large-scale PD efforts seem to bring into light some special concerns of their own (e.g., socio-economic, cultural and political issues). As Readhead and Brereton (2008) recently argued, PD with interdisciplinary collaboration should become more strictly required in order to make all large-scale ICT development programs more socially responsive.

## 2.2. Children's Genuine Participation

Conceptions on children's participation within environmental and urban planning have been greatly affected by the actions of the United Nations. Children's rights as members of society and their opportunities to have a voice in decision-making affecting their everyday life have been issued in the UN Convention on the Rights of the Child, in 1989. Child participation in that context is commonly understood as "the process of sharing decisions which affect one's life and the life of the community in which one lives" (Hart, 1992, p. 5). Researchers have tried to understand what it is that makes children's participation authentic and genuine in contrast to non-participation. Children's participation may only refer to being present, but also to one's actions having some influence (Thomas & O'Kane, 1998). Participation may be manipulation, decoration or tokenism, but also genuine, including forms such as 'assigned but informed', 'consulted and informed', 'adult initiated, shared decisions with children', 'child initiated and directed' or 'child initiated, shared decisions with adults' (Hart, 1992). In further elaboration of Hart's (1992) work, Reddy and Radna (2002) present thirteen 'scenarios of adult-children engagement' starting from adults actively resisting children's participation and ending in jointly initiated and directed

participation. Different levels of engagement may be useful and needed for particular tasks (Shier, 2001), considering also children's age and developmental stage (Thomas & O'Kane, 1998). Sinclair (2004) sees the factors forming a complex system, which the involved should be aware of to ensure the honest nature of engagement (see Chawla & Heft, 2002 for criteria for genuine participation).

Van der Veen (2001) distinguishes two perspectives to participation: a system and a life-world perspective. From the system perspective it is important to stimulate all the citizen groups to have an active input in society. As the models of this kind are often designed for adults they offer children few opportunities for genuine involvement (Qvortrup, 2001). These participation models are system-controlled and adult-initiated, based on adults' rules, and do not take into account the informal networks that are part of children's present-day life-world. School and home are often considered the only arenas for children to learn major life-skills (Chawla & Heft, 2002). From a life-world perspective, any kind of collective interest can offer a basis for participation (Van der Veen, 2001), and limits to participation are set mainly by the capacity and connections of the groups involved (Stroobants, Celis, Snick, & Wildemeersch, 2001). When fostering children's participation, the goal should be to create processes and procedures that do not depend on particular participants but are, rather, grounded in the everyday practices of the community and allow genuine and meaningful participation (Chawla & Heft, 2002; Sinclair, 2004; Cockburn, 2007; Maglajlic, 2010). Thus, the activities do not remain isolated incidents but make lasting change in the community, instead.

## 3. RESEARCH METHOD AND PROCEDURE

Our aim is to shed light on how some 'key actors' make sense of this complex endeavour of developing the educational network of a Finnish city and the role of ICT in it. The specific focus is on how children have been allowed to take part and to influence the solutions in the effort. At the time of our study, the development effort had been in progress for several years, and Smart Schools for advancing the project goals through various pilot projects and activities had been shortlisted. The Integrated Pilot School was under construction but the exact solutions for it (other than architectonic) had not been decided yet.

The development ideas of the Smart Schools included learner-centered orientation on development of pedagogical practices and new ways of using ICT to support learning. The results of the pilot projects included developments on modernized learning environments, pedagogical practices and technological solutions shaped by the local practices and organizational settings of the participant Smart Schools. Children had been involved in ICT development through different projects where they had been positioned in various roles, e.g., in planning and selecting technological equipment for the learning environments and in developing a mobile learning environment and learning game products for the schools. Such projects had been conducted in co-operation with national and city-level educational authorities as well as actors coming from various fields of research. Furthermore, representatives from several global and local companies (e.g., technology and interior solutions suppliers and companies developing ICT solutions) had been taking part in the efforts. The results and experiences from these pilot projects have been envisioned to apply and be further developed in local schools more broadly.

As we are dealing with a highly complex case with multifaceted set of issues and participants in a long term development project, an effective methodological framework and research strategy is provided by Nexus Analysis (NA), which refers to the mapping of semiotic cycles of people, discourses, places, and mediational means involved in the social actions we are studying (Scollon & Scollon, 2004, p. 14). Nexus Analysis may unify two different levels of discourse analysis, the micro-analysis of social interaction and a broader socio-political-cultural

analysis of the relationships among social groups and power interests in the society. The broader social issues are ultimately grounded in the micro-actions of social interaction and, conversely, the most mundane of micro-actions form a nexus through which the largest cycles of social organization and activity circulate (Scollon & Scollon, 2004). Furthermore, as Scollon and Scollon (2004) argue, discourse analysis is a powerful tool for understanding social life on the interpersonal and the organizational and institutional levels of social analysis.

NA proceeds through the three cycles of *engaging*, *navigating* and *changing* the nexus of practice. The first cycle (*engaging*) involves finding the social action to be studied and the researchers becoming acknowledged as legitimate members in the community in question. In this study, the research group identified five key actors establishing contact with them in meetings and by also more formally interviewing them. Two of the interviewees were project managers in the future school development effort, two were headmasters of pilot schools, and one a city-level development manager.

The interview data include five in-depth, active interviews (Holstein & Gubrium, 1997) emphasizing the collaborative and discursive nature of the interview situation) with each of the identified 'key actors' involved with the 'future school' development effort. An interview guide with a set of thematically organized questions was applied flexibly in the situation. The future school development effort was discussed in terms of its background and history, the nature of the effort, collaboration between the public, the business and the research sectors, building the ICT infrastructure and technology use, as well as the community aspects and future visions concerning the urban area and multifunction centre in question. The interviews (approximately one hour each) were transcribed. Interviewing children related to the case was not done as the numerous child participants involved in the already conducted projects were dispersed in different schools of the city, and information on the future pupils of the to-be-developed Integrated Pilot School

was not available. In this phase, other types of documentation related to the 'future school' concept was also collected, including, among others, official documents of the city, public information in the city portal, the city project pages, and documentation from the city board of education.

The second cycle (*navigating)* of nexus analysis proceeded through the study of the five interviews from a discourse point of view, i.e., how the interviewees made sense of, experienced and constructed the phenomenon under study (Scollon & Scollon, 2004). The notion of subject positions (Davies & Harré, 1990) became important in the analysis, i.e., ways in which speakers continuously construct themselves in relation to others. Such positioning may even be directed to other participants referred to in the talk (e.g., children in this case).

The material was analyzed through a succession of data-driven stages: 1) Initial observations, 2) In-depth analysis of one interview (central topics, how they were talked about, subject positioning in relation to the interviewee and the children in the development process), 3) Extending analysis to all data, 4) Synthesis of main discourses and positions, aspects of NA. Finally, research on children's participation in ICT development was used to elaborate the findings.

As for the third cycle of nexus analysis (*changing*), researchers trigger transformation of practices in the community from the moment they come to contact with it. This inevitably happens when the researchers enter the scene and start engaging the nexus of practice (Scollon & Scollon, 2004), as was the case also in this study. Furthermore, in the context of this research effort, the research team has also carried out several interventions aiming to change the nexus of practice, including interventions enabling school children as well as their parents to take more actively part in the construction of the future school. However, this has been done after collecting and analyzing the research material included here, and will be, therefore, not discussed further in this paper.

## 4. EMPIRICAL INSIGHTS

In the discourse analysis of the five key actors constructing the future school, six subject positions were identified in the talk of the interviewees (Table 1). One of the pilot school headmasters (I1) speaks about children's participation from two different positions: On the one hand, he displays himself as a grassroots-level practitioner through his experiences in everyday school work with children. On the other hand, while bringing up the co-operation within the international educational network, he views the future school process from the point of view of an actor in a global network. The second pilot school headmaster (I2) positions himself as a promoter of the future school. The position of change agent is connected to a project manager of the future school development effort (I3). The subject position of an advocate of learner-centred product development is connected to another project manager of the development effort in question (I4). The city-level administrator (I5), when talking about children's participation, finally, was seen to take the position of a strategist advocating children's participation.

From their professional positions in the 'future school' development effort the key actors were able to enable the participation of school children in the activities at pilot schools. Furthermore, we focused on the positions that the key actors from their own subject positions produced for children during the interviews (Table 1): child as a user, an informant, a tester or an active participant.

In the following, children's participation in the ICT development for the future school effort will be presented from the perspective of their positions as assigned to them in the interview talk.

### 4.1. Child as an Innovative User

In the interview talk, first of all, children were observed as users (cf. Druin, 2002) of learning technologies while working with their laptops and utilizing different programs in learning events. Related to children's participation in ICT development, an interviewee from the subject position of the actor in a global network characterizes children's positions as technology users and content producers in a study project closely connected to a global company and its products as follows: *So children's participation in this phase has rather come through contents and projects, like when they have started doing something, let's say the water project they were working on. As a group they ... I was following it and I have later been able to see through video how it was completed ... in that phase they just got a project topic and started as a group to consider how it would be done and what they would need and who would be involved and so on* (I1).

In the following, an interviewee speaking from the grassroots level practitioner's subject position describes children's position in ICT development as innovative users, i.e., innovatively developing new ways of uses for the existing technologies at school: *And where this kind of participation has come up sort of naturally [- -] how these school children, third-fourth-graders, how they, in a way, take part in using these devices and programs by sort of*

*Table 1. The subject positions in future school development effort*

| Position of the Interviewee | Position of the Child |
|---|---|
| I1: Grassroots level practitioner, actor in a global network | User, informant |
| I2: Change agent | Informant |
| I3: Promoter of the future school | Informant |
| I4: Advocate of learner-centred product development | Tester, informant |
| I5: Strategist advocating children's participation | Active participant |

*inventing most ingenious shortcuts [- -] Children cut corners wherever they can and they often find quite new applications* (I1).

Furthermore, the same interviewee describes the technologies as participatory as such while offering possibilities to school children in finding novel and personal ways of use in learning context, compared to more conventional ways of learning: *So, that's how this new technology actually could be said to be participatory in itself, if it is compared with the old kind, based on a textbook. The book was there, you were able to participate by underlining something, but now you can, in principle, create totally new working methods with it* (I1).

## 4.2. Child as an Informant

The child's position as an informant (cf. Druin, 2002) was also identified in the data, related to the pilot development projects to do with the learning environments of the Smart Schools. These projects typically dealt with the physical environment and the construction of the technological infrastructure. One example of this kind was mentioned by an interviewee from the grassroots level practitioner's subject position. He describes how the school children were giving comments on the house plans and plans on technological solutions for the learning environment to be developed in practice: *But then, for example, when this plan for the future school classroom was being done with the architect's office for the upper concourse, the pupils were here involved so that I had once, we were at the office, so we had pupils with us and this completed plan was taken to them for comments: what they think it looked like and what benefits it would have* (I1).

Elected representatives of the school children had been given possibilities to contribute to the ICT development process also in another pilot project. The interviewee, in the position of a change agent, describes children's position as informants in meetings: *Well in these joint meetings when the premises have been planned and put into practice, at regular intervals, the representatives of the student body, representa-tives of children and representatives of pupils have been present in planning meetings* (I2).

The representatives of the school children had been asked for comments concerning the selection of the specific technical equipment: *So we have now asked them about and discussed right this, what sort of technology it is that they want. For example, about game consoles and musical equipment and if there could, should be, for example, a docking station like for <mobile device> where you can stick your own phone and watch those snowboarding videos or your own music videos when there is spare time. This is the kind of stuff there's been* (I2).

Children's continuous participation as informants in technology development also emerged in the data. Speaking from the grass-roots-level practitioner position, an interviewee envisioned children's participation as them commenting their everyday use experiences of the learning technologies related to their school activities: *What I think myself about involvement and this kind of school activity in general; this is kind of continuous development. In that sense you could imagine that you could study participation also while you go, even though technology is already there, but also hear children's views, like what works, what could be different* (I1).

Another interviewee, speaking from the position of a `future school´ promoter, envisioned that children utilizing learning environments could contribute even more extensively to the development of their learning environments: *I think that children's role there [in planning] has been fairly minimal now that you consider the kind of technology that is coming there and has been chosen, when those children are all around <city>. But perhaps, when the activities are launched, I think they will have a great role when we start building those learning environments, electronic learning environments and so on. How those will be utilized then, so that is where their role is certainly great* (I3).

Furthermore, in the context of advocating learner-centred product development, children were envisioned to participate even during the very early phases of the technology develop-

ment: *Talking about learner-centred technology development, as I said about <product development project> we involve users early and above all so that they can have an impact on applications or products or services* (I4).

## 4.3. Child as a Tester

In the data, children's participation as testers (cf. (Druin, 2002) was related to user evaluations of the learning solutions produced during the learner-centred product development. The school children had participated in the evaluations of a mobile learning environment and a learning game to be developed, as the interviewee from the subject position of an advocate of learner-centred product development presents: *So this kind of usability information, now <mobile environment> is just one example there, another good example of what's been done well is this <learning game>, it was used with fifth-graders, niners and pupils in upper secondary grades. And during that half-hour gaming session one saw that it was meaningful, pupils were smiling, everybody had a good time and stuff had been learnt* (I4).

Furthermore, technologies for the future school are envisioned to be developed in co-operation with companies and other actors. In this vision, concerning the learner-centred product development process, children are considered to participate as testers of technological solutions and related practices in their school environment: *Products, concepts are tested together with companies and with researchers and with practitioners, i.e., teachers, and through them also pupils and the pupils' parents become involved in this product development collaboration. Those well-working concepts are tested, which provides feedback and that's how good practices ... faster or faster than before ... can become transferred as part of practice* (I4).

## 4.4. Moving Towards Genuine Participation

Children were seen as users, testers and informants in the technology development process (cf. Druin, 2002), but more interestingly, also

the role of the school in enabling children's genuine (Hart, 1992) participation became prevalent. This perspective was presented by an interviewee from the subject position characterized as strategist advocating children's participation. Accordingly, children's genuine participation could be realized at school by allowing children to take part in constructing their school and planning the activities in there. However, school children's participation as it is today could be improved: *Children are more involved as active agents in the school environment [- -] However, pupils are still too seldom taken along in school planning although there's been a great deal of progress* (I5).

The interviewee stressed the responsibility of the adults in enabling children to participate in the planning and decision-making of school activities. Below, the interviewee brings up the system perspective (Van der Veen, 2001) to children's participation: *We have spoken a lot with headmasters already that in schools they must now involve the pupils in school work so that you don't only have a program committee that organizes parties or sells sweets during breaks, but the pupils could genuinely have an influence, always having certain items on the agenda in the teachers' meeting, items for the student body, there could be pupils present at the teachers' meeting* (I5).

Schools have structures already allowing or enabling children's participation: *If I think about community feeling and opportunities for influencing, I think it could well be done with children and young people [- -] We do have well-functioning organizations, student bodies at each school, and there is really favourable ground, because it is them, who are thinking about what it is that the student body could assume more responsibility over, while it is always offered the kind of role that it is nothing more than a party organizer, celebrator* (I5).

From the life-world perspective (Van der Veen, 2001), the interviewee envisioned further that school children's participation could be planned even more genuine. In this vision of child-initiated participation, children are allowed to influence equally the settings for

their involvement: *If you consider how one could promote children's and young people's involvement one must ask children and young people about it. So the activity is done sort of directly with those children and young people* (I5). Even the view of allowing children's participation in nearly all actions at school was emphasized: *If you consider where pupils cannot participate in the school there isn't much where they can't* (I5).

Furthermore, the interviewee highlights the role of the school in responding to the challenges that children are likely to confront in the society of the future. For fostering children's participation in society, children's participation skills have already been trained in practice in relation to school activities: *From the third grade to the final year in the upper secondary school all the groups have gone through training on inclusion where there's been grouping, and people have got acquainted with municipal decision-making and some meeting practices* (I5). The interviewee also mentions a local citizen meeting event as an example of children's active participation as citizens: *This citizen meeting, absolutely great presentations were given, they were definitely not something they would have prepared in advance, because these children and young people presented really many questions* (I5).

## 5. CONCLUDING DISCUSSION

The main message of this paper is to make visible the role of children as potential and even necessary participants in multidisciplinary and complex, large-scale ICT development efforts concerning children. There is research already available on children's participation related to ICT innovation and design. There are reasonably established tools and methods to involve children as informants, users, testers and even design participants in specific, small-scale ICT efforts (cf. Druin, 2002). However, children's role in large-scale ICT efforts seems to be less strong.

In this paper, children's positioning in the construction of the future school was identified through a discourse analysis of the interviews with five key actors. In the analysis, six subject positions emerged from the interview data: a grassroots level practitioner, an actor in a global network, a change agent, a promoter of the future school, an advocate of learner-centred product development, and a strategist advocating children's participation.

Based on the interviews, one could argue that the role of children as participants in specific ICT projects is everyday knowledge for practitioners from many different fields. First of all, children were viewed as innovative users (cf. Di Blas, Paolini, & Sabiescu, 2010; Sawhney, 2009; Weibert & Schubert, 2010) of learning technologies. Furthermore, they were positioned as informants (cf. Antle, 2003; Eriksson & Lykke-Olesen, 2007; Williams, Jones, & Fleuriot, 2003) in the learning environment development projects for the future school. They had been asked for comments concerning the architectural plans and plans for the selection of specific ICTs. In addition, children were mentioned as testers (cf. Antle, 2003; Cuthbertson, Hatton, Minyard, Piver, Todd, & Birchfield, 2007; Eriksson & Lykke-Olesen, 2007) of a learning game and a mobile learning environment. However, besides their rather minor role during the overall planning of the specific ICTs of the pilot schools, children were not pictured as design partners (as was the case also in the reviewed articles). In the future, children were, however, envisioned to be involved in the learner-centred development of specific ICT even from the early stages of the development process.

It seems possible to conclude that all the four main roles of children's participation in the design process of specific ICT (cf. Druin, 2002) were traceable in the interviews. When considering large-scale ICT development efforts, these types of project-based participation in concrete, small scale sub efforts are certainly fruitful to take into use after decisions have

been made and the concrete development of the specific subsystems begins. Together, our data and the literature review on children's role in large-scale ICT efforts indicate, however, that the role of the real development partner in the whole development effort is missing. Rather, children's participation seems to be dependent on adult members and their more or less formal roles as advocates of the inclusion of the children together with the situated nature on their knowledge about the proper types of participation. Yet, the way practitioners in our case expressed their eagerness to acknowledge the children's right to participate is nevertheless promising. The talk circulated around social inclusion and the empowerment of children. Nevertheless, even if recognized as valuable and important by the key actors, systematic practices yielding comprehensive impact on children's participation as active development participants seemed to be still emerging.

We would like to extend the concept of children's participation towards more respectful, genuine participation in the multidisciplinary planning and preparing of large-scale ICT development efforts, which involve decisions affecting the everyday life of very a wide audience, including children. Children should not be considered merely as family members or members of a potential target community. Instead, more attention should be paid to respecting them with their own special characteristics as child participants. In fact, our case pointed out that children with their valuable insights should be involved in these kinds of processes as key players in a genuine sense.

The solutions suggested for children's more genuine participation in this case seemed mainly to rely on the system perspective identified in the literature (Van der Veen, 2001). It maintains that people should have an active input in society; participation models, however, are often designed for adults and based on adults' rules (Qvortrup, 2001). Student bodies and city councils are seen in our case as ways for children to take part in decision-making that affects their life. Students are usually elected for these bodies. Interestingly, this participation

model bears some resemblance to the traditional one discussed in earlier IS literature, as it recommends electing user representatives to take part in IS projects as equal participants in decision-making (e.g., Mumford, 1983).

On the other hand, our case also gives some hints on considering the life-world perspective on children's participation (cf. Van der Veen, 2001), since it is mentioned that children should be involved also in planning on how to foster their participation. This would clearly enable stronger child-initiated and directed participation, and the informal networks, that are part of children's present-day life-world, could enter the scene, crossing the boundaries of school and home as more traditional arenas of participation. While learning their life-skills, in order to become valuable contributors in society, children might be stimulated to become active in relation to issues involving their everyday life. In this way, participation might be better grounded into everyday practices of the community, thus becoming more genuine and meaningful (Chawla & Heft, 2002; Sinclair, 2004; Cockburn, 2007; Maglajlic, 2010). The activities would not remain isolated incidents but make lasting change in the community, instead. Especially, the life-world perspective on participation is relatively new to the IS community and could be of use also in connection with adults.

All in all, from the point of view of children's participation in large-scale ICT efforts, there seems to be a demand to create proper conditions of entry and social support both for competence and reflection. To draft these new processes and practices grounded in the everyday life of children is the first step. To find the most successful and effective ways, i.e., to make children's participation more genuine, is a step even further. No doubt, there is a need to consider the potentially new ways in which children of various ages and developmental phases need support for their meaningful participation. In the case examined in this paper, children of very diverse ages have taken part. There are mentions from third graders (9-10 years old) to niners (15-16 years old) in this paper, showing

that children of different ages indeed have, in these already established roles, taken part in ICT development. The existing research is also full of methods and advice on how to enable the participation of children taking into account children's age. However, introducing the children's agenda into already quite complex and multidisciplinary practice will most certainly be a considerable challenge. These types of cases typically address a remarkable population of children, a large geographical area such as a city, and the interests of a number of different stakeholders making it more challenging to involve each and every interested party as a real design partner. The discussions reported in this paper show, that in order to move from words to action, there is a necessary change needed in the contemporary culture of large-scale ICT development as well as in the interaction order in which the development currently takes place.

In fact, the implications of this research also relate to the contemporary discussion concerning the cultural change of ICT development in general. The move from traditional development-oriented practices towards market-based IS acquisition and development (Sawyer, 2001) totally changes even the traditional practices of development. From the point of view of this paper, this means that children should become empowered as genuine participants of planning large-scale ICT selection practices (not merely as evaluators of potential subsystems) as well as active members discussing the potential actions and changes needed based on the results and experiences of these selections. Further research is definitely needed in this respect in order to move from kind words to real actions and to make large-scale ICT development efforts socially more responsive. We also highlight the importance of the multidisciplinary perspective in this respect both in research and practice.

Ethical aspects of children's participation have been considered in relation to this study but also in the wider context of the research group's interest on engaging and strengthening children's participation. In this research case of constructing a 'future school', engaging the school children and their elected representa-

tives on the ICT development process has been conducted through their school activities and the existing structures allowing participation. The activities have thus been also conducted under the supervision by the educational authorities from various positions, who as representatives of the school have also been responsible for the procedures of the children's participation. All the educational authorities represented in this research are, based on their professional background, aware of children's age and developmental stage while involving children as participants. In the further research, it is of interest for the research group to continue the discussions of the ethical aspects related to children's participation, and we hope that the discussions raised in the related future interviews add the interviewees' awareness of the topic. Furthermore, as our general objective is on strengthening children's participation in ICT development, also the methodologies respecting children's authentic and genuine participation will be explored further.

As for the limitations of the study, the data were collected from one case only. However, when analyzed from a discourse perspective they provided a rich and abundant resource for further study. Still, studying an ICT development effort with a complex setting and a variety of actors, more material should be gathered to gain a more comprehensive understanding of the issues under scrutiny. It would be of interest to continue the research by interviewing children and teachers, as well by gathering other types of data (e.g., observed practices in situ). Also other large scale efforts involving ICT development for and with children would be of interest to study. On the other hand, based only on this one case, other communities with similar characteristics could already utilize these results at least through advocating the roles for children discussed in this paper in their development efforts. We especially welcome other researchers and communities to experiment with enabling children's genuine participation in ICT development efforts.

Nexus Analysis behind the present study provided us a lens for examining the phenom-

enon under study from a variety of perspectives. This study is one of the many inquiries into children's technology-rich everyday life and participation conducted by the research group. Even though this paper only gives a narrow angle from the navigating phase of NA to the phenomenon under study, the picture will be more extensive when we will be able to combine the angles together after subsequent studies.

## ACKNOWLEDGMENT

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