

Children Imitate! Appreciating recycling in participatory design with children

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ABSTRACT

The cooperative design practices as well as the participatory research tradition and contextual design have inspired the researchers of a relatively new and challenging design context, i.e. design *with* children *for* children. An ample literature base of its own has been generated on the subject already. However, the phenomenon of children imitating each other's work in the design sessions has been largely disregarded in current research. This article sheds light on the practices of 'recycling', originally characterised as 'imitation', in the drawings produced by children during participatory design workshops in a school setting. The article suggests that instead of ignoring the issue of imitation and recycling, practitioners might start to appreciate it; both when planning design sessions as well as when making interpretations and judgments on the basis of the results produced by children. Implications for practice and future research are discussed.

Author Keywords

Collaboration, design workshop, multidisciplinary research, methodology, multimodality, technology-rich everyday life

INTRODUCTION

As children are a growing group of active technology users, their participation in technology design has attracted interest of participatory design researchers, inspired by the Cooperative Design practices (Greenbaum and Kyng, 1991) of Scandinavia as well as the participatory research tradition (Schuler and Namioka, 1993) and Contextual Design (Beyer and Holtzblatt, 1999) in the U.S. An ample literature base of its own has been generated on the subject already (e.g. Druin et al., 1999; Guha et al., 2005; Jensen and Skov, 2005; Read et al., 2005). However, the phenomenon of children imitating each other's work in the design sessions has been largely disregarded in current research on participatory design. In the case of the present paper, a broader understanding of the subject is looked for by

integrating perspectives from participatory design and nexus analysis.

In this study we scrutinize a phenomenon that was originally identified as 'imitation', behaviour modelled by someone else's behaviour, as evidenced in participatory technology design sessions with children. The study is part of a long-term research programme on children's technology-rich everyday lives. The research interest for the present article arose among the multidisciplinary research group from the results of a student research project that was run between autumn 2008 and spring 2009 with design workshops with children, in order to gain an understanding of children's opportunities for shaping their technology-rich living environment. The project was conducted in collaboration with a comprehensive school, which had a need for developing a design for a digital portfolio. The children who took part in the project were from grades three and four (9-11 yrs). During the workshops, the children produced numerous drawings as visions of their portfolios. These drawings provide the primary data for this study.

During the project there were some recurring accounts among the project members concerning the children's eagerness to reuse or copy elements from different sources in the design workshops. This phenomenon was continuously discussed in the course of the project. An entry from a project research diary (Tutkimuspäiväkirja, 2008) pinpoints the issue as follows: "*The other half of the third-graders had difficulties in understanding the concept of user interface. Because of this, one member of the project group explained the term by drawing a simple example of a giraffe on the board, and by showing how this giraffe could itself act as an interface (e.g. one can click its eye in order to get to the next page). Due to this, some designs included identical copies of the giraffe...*" Among the project members, this was seen as problematic.

This concern was later reflected upon and discussed in the multidisciplinary research group in the light of nexus analysis. Nexus analysis widens the study of social action into the networks of participants (interaction order), their experiences and histories (historical body) and real-time, multimodal, situated discourses (discourses in place) (Scollon, 2001; Scollon and Scollon, 2004). Nexus analysis sees the nature of social action as multimodal and highlights the importance of a gradual process in perspective-taking when the researchers - becoming

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legitimate members of the community in focus - aim at identifying the central participants, cultures and discourses through a range of methods such as ethnography, as well as scene and discourse surveys among others. In intertwining data and theory-driven cycles drawing upon nexus analysis and research on participatory design with children, what was first characterized as 'imitation' began to emerge as a broader range of practices, which could more appropriately be described as 'recycling', i.e. participants' practices of reusing elements from each other's work in exact or processed form.

Consequently, recycling was seen to be a natural feature of human interaction, socialization and learning, having a multitude of manifestations and varieties as well as functions in any community. It was deemed surprising, however, that in current research on participatory design this phenomenon has not been given wider interest. Rather, the emphasis seems to have been on generating innovations involving users as design partners (see e.g. <http://www.pdc2010.org/>). We wish to discuss imitation as a natural part of the participatory design process and suggest reconsidering the nature of the outcomes of such participatory design sessions, and argue for a better appreciation of 'recycling' in the interpretation of the results. Therefore, this study aims at shedding light on different types of recycling as well as their possible implications for participatory design with children.

Below, a review of related research will follow with a consideration of the concepts and viewpoints that have inspired us in making sense of 'imitation' and 'recycling'. After the presentation of the research procedure, the actual empirical findings will be provided. In the final section, possible implications of the findings will be discussed.

RELATED RESEARCH

The tradition of Participatory Design (Schuler and Namioka, 1993), originated from the Scandinavian Cooperative Design approach (Greenbaum and Kyng, 1991) and research projects (see articles in Brown and Levinson, 1987; Schuler and Namioka, 1993), has originally focused on user and especially worker participation in systems development. Researchers have afterwards extended participatory design to new design contexts such as participatory design with children. Initially, the focus was on children as users of technologies and on the consequences and impacts of the technologies on children. Later, the focus has moved to involving children as testers, informants and design partners in technology design (Druin, 2002).

The design approaches of User-Centered Design (Norman and Draper, 1986), Contextual Design (Beyer and Holtzblatt, 1999), Learner-Centered Design (Soloway et al., 1994), Participatory Design (Carmel et al., 1993; Greenbaum, 1993; Schuler and Namioka, 1993), Informant Design (Scaife and Rogers, 1999; Scaife et al., 1997) and Cooperative Inquiry (e.g. Druin, 1999; Druin et al., 1997) have all been applied to involve children in the design process. These design theories are varying as regards the users' (adult or child) involvement and their

positioning in the design process (Nesset and Large, 2004). The Cooperative Inquiry approach, in particular, has adopted traditional participatory design techniques refined to working with children and respecting children as design partners (Druin, 1999; Druin, 2002; also Garzotto, 2008). In our research, we are not focusing specifically on any of these approaches or applied design techniques and methodologies as such. Rather, previous research will be reviewed from the analytic perspective of recycling.

Participatory Design with Children in Light of Recycling

Although the notions of imitation, repetition or recycling, for example, have not been examined or explicitly reported in the existing literature, references to the phenomenon can be found, nevertheless. The concepts that we will elaborate upon in this section will be power relationships, team dynamics and quality criteria for design sessions with children, each contributing to the discussion of the phenomenon.

Different aspects of power relations and team dynamics during the design workshops carried out by intergenerational design teams have been reported (Druin, 1999; Druin, 2002). Druin (1999) suggests, for example, that adults may help children to overcome these traditional power structures by wearing informal clothing and by avoiding interviewing questions. In this way, researchers can reduce their status as 'authority figures' and make it easier for children to feel comfortable with sharing their thoughts (Druin et al., 1999). Hanna et al. (1997), in the context of usability testing, have also given guidelines aiming to decrease the influence of the existing power relations.

Pardo et al. (2008) discuss the role of children in evaluation of educational software intended for use by children. Referring to Druin et al. (1999) they remark that teacher involvement has been seen as undesirable as the existing power relationship between teachers and students could lead to a situation wherein the children might feel tested or compelled to perform well. While they (Pardo et al., 2008) see that the concern of the existing power relationship has kept teachers on the periphery of child-based evaluation, they instead value the combining of elements of both expert and user-based evaluation. In the context of educational software they appreciate the inclusion of the teacher in the evaluation process as an expert educator, improving the diagnostic power of evaluation and its sensitivity to pedagogical issues. They conclude that both designers and children did welcome the teachers into the evaluation process.

Druin (1999) has reported team dynamics as having influence on children's participation in prototyping-sessions. For example, a single adult in a group of several children can create team dynamics with the feel of a classroom, thus, reducing productivity. It seems that a group with a single child is not productive in a collaborative design experience either (Druin et al., 1999). It has been suggested, in fact, that two to four children paired with two to three adults may create a productive brainstorming experience (Druin and

Solomon, 1996; Druin et al., 1997). Children's age has been considered as one aspect influencing the productivity of prototyping workshops. Druin (1999) considers children aged 7-10 years to be open for new ideas and the most effective prototyping partners, being able to understand the abstract idea of designing technologies with low-tech prototyping tools.

Guha and colleagues (2004; 2005) also bring up the viewpoint of productivity in relation to brainstorming processes with children. The technique of 'mixing ideas' is used to foster effective collaboration, especially with young children (ages 4-6) during a brainstorming design process. This technique is a framework for merging individual ideas into 'bigger', collaborative ideas. Guha et al. (2004; 2005) have observed difficulties among young children in collaboration when elaborating on one another's ideas during the design workshops. They have presented the children's stage of development as a challenge for 'mixing ideas' collaboratively (Guha et al., 2004).

Based on the investigations on the design of e-learning experiences in the educational environment, Garzotto (2008) suggests that children can play a key role as experience design innovators in discovering new creative forms of using digital artifacts. Inter-group collaboration was paid special attention to, as the children themselves seemed to prefer collaboration between groups, e.g. by looking at the other groups' outputs and sharing visual material.

Morajevi et al. (2007) have used comicboarding as a participatory design method that uses specially created comic books to generate engaging and productive brainstorming sessions with children. They suggest that children may bring in ideas from existing comics in the series rather than generate new ones. Furthermore, the scope of the generated ideas is limited since the context and theme of the comicboard according to comicboarding techniques are predetermined. This can be seen as an example of children reusing, rather than inventing, in brainstorming sessions.

Read and colleagues (2005) have explicitly reported the problem of imitation, arguing that children might change their designs on the basis of what other children have ideated. The article explicitly mentions the reuse/imitation aspect but does not elaborate on this any further. In other articles (Kelly et al., 2006; Mazzone, 2007; Mazzone et al., 2007), these researchers have also stressed the need to evaluate the quality of the design solutions produced while working with children: considering, for example, to what degree the design ideas of children can be applied in design solutions and how the quality can be assessed. They (e.g. in Mazzone, 2007) further discuss the factors affecting children's behaviour in the design situations and their possible consequences in design.

Sluis-Thiescheffer et al. (2007) have compared and evaluated the outcomes of brainstorming and prototyping as early design methods with children. They emphasize the number of ideas that are produced during the design session as essential. Based on their quantitative

comparison, prototyping is argued to be a better method because more ideas are generated during prototyping than during brainstorming sessions.

Altogether, one can argue that the extant literature seems to be concerned with efficient and productive design sessions with children, during which original and independent ideas are to be produced. Within this line of reasoning also the ideal assembly of intergenerational groups for most productive workshops has been discussed (e.g. Druin et al., 1999; Druin and Solomon, 1996; Druin et al., 1997). In this light, the phenomenon of imitation seems to be counterproductive as it hampers the maximal generation of ideas during the design sessions. The observations on power relations and team dynamics in the literature on children's participation during the design sessions can also be connected to the 'problem' of imitation.

Even though some traces of studies taking into account the phenomenon of imitation can be found in participatory design literature, we felt that after the literature review we still had a rather narrow view of the topic. To achieve a more comprehensive understanding of the subject at hand, additional perspectives were needed. Therefore, some complementary research was examined in relation to language and interaction, learning as well as multimodal discourse.

Recycling as a Practice for Learning and Participation

In applied language studies and learning research, the notions of recycling, imitation and repetition among others have been studied from a variety of perspectives. They are seen as fundamental methods for socialization and learning for humans starting from early childhood. Children may, for example, practice different 'schemata' for social interaction through play (e.g. playing house) (Piaget, 1952; Vygotsky, 1978; Wertsch, 2004). Community cohesion and 'solidarity' may also be created, maintained and strengthened through playful interactional practices (Brown and Levinson, 1987; Scollon and Scollon, 2004; Wohlwend, 2008), e.g. through recycling (Scollon and Scollon, 1983). In gaming situations, recycling and repetition seem to be essential tools for participation and language learning (Gee, 2003; Piirainen-Marsh and Tainio, 2009). Reiteration of language elements, e.g. through repetition of lexical items or syntactic structures, is considered a central device for creating textual cohesion and discourse coherence (Halliday and Hasan, 1976). It is also an efficient rhetorical device in persuasive discourse such as sermons and advertising (Cook, 1992).

The notion of multimodality provides us with a framework for observing aspects of meaning-making and communication more broadly than as a matter of language (Halliday, 1973; Kress, 2003; Kress and Van Leeuwen, 1996; Kress and Van Leeuwen, 2001; Luukka et al., 2008; Norris, 2004). It also entails a broader range of affordances for recycling such as gestures, proxemics (the use of space), posture, head movement, gaze and print (Norris, 2004). From the perspective of visual design, multimodal means may include visual order, layout, colours, foregrounding vs. backgrounding and

cohesion on a conceptual level (Halliday, 1973; Kress, 2003; Kress and Van Leeuwen, 1996; Kress and Van Leeuwen, 2001).

Recycling may, thus, contribute in various ways to the interaction order between participants (Goodwin and Goodwin, 1987), e.g. what the nature of relationships is in the group and how bonding between members is actualised. How this is actualized in a classroom, has also grounding in the historical body of the participants. Classroom 'culture' with its conventions and rules of conduct, power relations and community dynamics is constructed in the interaction between its members. Further, in dealing with today's technology-rich world, children need to be 'multimodally literate' (Gee, 2003; Jewitt and Kress, 2003; Kress, 2003; Lankshear and Knobel, 1997) as life with technology seems to involve adapting communication forms and developing new forms based on both constraints and enablements (Keating, 2005; Luukka et al., 2008).

RESEARCH PROCEDURE

Next, the research setting as well as the principles for data collection and analysis will be explicated in more detail.

Setting

The setting for the study was at a local comprehensive school (grades 1-6) in Finland. Two groups of children took part in the design workshops, one from the third grade (age 9-10 years) and another from the fourth grade (age 10-11 years). The project group organized one workshop with both groups, asking the children to design their own digital portfolios. The task for the children was to draw a user interface for a personal portfolio application. The children were guided to design a user interface, which they would like to use themselves, and correspond to their view of a sensible user interface for a portfolio. The workshops were not run concurrently. From the point of view of this study, it is important to know, that the first workshop was organized with third-graders and the researchers were able to reflect their experiences before organizing the second workshop with fourth-graders. For the second workshop, some important changes were made, which also had implications for the workshop results and respectively on our empirical findings.

Data Collection

The research material was collected by the project group from two design workshops. In each workshop, the children were divided into two groups, which were given identical assignments. In both groups, there were project members observing and helping the children to accomplish the task. The workshops started by an introduction by the project group to the project goal, i.e. to design the user interfaces for their personal digital portfolios. The core concepts of the design task were 'portfolio', 'digital portfolio' and 'user interface'.

For discussing the concept of 'portfolio', the project group referred to an electronic learning environment familiar to the children (*Opit*, developed by WSOY, one of the leading publishing companies in Finland). For the actual design task, advice was given as follows: 'Use your imagination, and also think about anything funny.'

For the third-graders, the research group presented a web browser as an example of a user interface. During the session with third-graders one of the researchers in the project group drew a giraffe as an example of a user interface, with its eye as a link leading somewhere. For the fourth-graders, the researchers refined their presentation on the basis of their experiences in the first workshop. This time the user interface was demonstrated only by referring to some drawings of a laptop user interface the children had produced earlier, independently of this research effort.

The empirical material of this study includes the main results from these workshops. In total, the third-graders produced 41 and the fourth-graders 27 drawings as their portfolios. This primary material is complemented with other related materials such as the project report produced by the research project, field notes written by individual project members as well as project documentation (e.g. initial plans and instructions provided by the researchers before the intervention).

Data Analysis

After the design workshops, all the children's drawings were scanned and stored for the purposes of the study. Three members of the multidisciplinary research group were assigned the responsibility for initial data analysis. The drawings were examined with the overall goal of inductively identifying evidence on recycling. The concepts of 'copying', 'imitation', 'repetition' and 'multimodality' as well as the notion of social action as the intersection of interaction order, historical body and discourses in place were also used as heuristic devices in the process. One of the researchers concentrated solely on the drawings made by the third-graders and the second on those of the fourth-graders. The third researcher examined the drawings by both groups but on a less detailed level. The analysis entailed a general examination of the drawings, but also counting occurrences of various elements such as links and pictures. The three analysts also individually produced characterizations of the common themes and selected interesting examples of the drawings. Afterwards, the researchers organized joint multidisciplinary data sessions in which the findings were discussed and combined to produce shared understandings.

To sum up, in the case of this particular study, the focus of the scrutiny has been delineated to 'recycling' (first identified as 'imitation') in the drawings produced by the children in the design sessions. However, the wider context and the intersecting elements of social action will be discussed when interpreting the results. Social actors draw upon a constant interplay of various communicative modes in order to perform mediated actions. In the analysis of our data, this is seen in taking under focus not only the drawings produced by the children, as 'products', but also the situations in which they have been produced, and the wider connections that they bring together.

IDENTIFYING RECYCLING IN DESIGN SESSIONS WITH CHILDREN

In the following, evidence related to recycling in the data will be presented. Particularly, we will focus on different sources of inspiration for recycling that we have identified among the third and fourth-graders.

Inspiration from the Instructional Examples

The way the concepts of ‘portfolio’, ‘digital portfolio’ and ‘user interface’ were represented to the children quite obviously had an effect on how the children applied them in the design task. As mentioned, for the third-graders, the research group presented a web browser as an example of a user interface. Consequently, almost all (36 of 41) of the drawings produced by the third graders can be considered as web browsers. The browsers included address bars with web addresses, some existing and familiar (e.g. www.miniclip.fi and www.habbo.fi) and others invented, referring to the main theme of the drawings (e.g. www.bunny.com, www.knightgames.com). Most children (36) had drawn arrows for navigating back and forth in the upper left corner of the drawing. In five drawings, there were also buttons for bookmarking and favourites. Other buttons in the upper right corner or close to the web address bar were also depicted (e.g. e-mail, chat and reload).

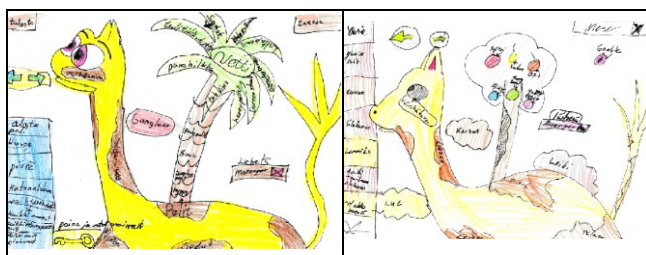


Figure 1. Giraffe pictures drawn by third-graders

As mentioned above, one of the researchers in the project group also drew a giraffe as an example of a user interface. This idea was clearly copied into three drawings, in two of which the body parts of the giraffe also acted as links in the same way as in the example (see Figure 1).

Inspiration from the Peers

As for the fourth-graders, various aspects of visual design were recycled between peers. Three children produced almost identical results (see Figure 2). All pictures were vertical (while there were only 5 vertical out of 27 in total), each copying the same, massive character cut in the middle. Two of those characters are exactly the same. These three were also the only products with ready-made pictures in this group. The overall style and vocabulary were also quite similar. Otherwise, the pictures of the fourth-graders looked quite different and it is not possible to say on the basis of the data to what extent the children had been recycling ideas and material from each other.



Figure 2. ‘Joker’ pictures by fourth-graders.

When analyzing the drawings of the third-graders, it was also obvious that some children had been inspired by the ideas seen in others’ drawings. Several common themes could be identified in the drawings. Those were, for example, the following ‘links’ or ‘folders’: “games” (in 28 drawings), “pictures” (in 16 drawings), “videos” (in 15 drawings) and “music” (in 14 drawings). Regarding the pictures drawn, especially different kinds of animals were observable in the drawings (14 drawings). Another very popular object was the matchstick man that could be found in 9 drawings altogether. A common theme was also the battle that was represented in 12 drawings. Buildings (8), trees (7), blood (6) and ‘poo’ (6) were rather popular as well.

An interesting group of four drawings includes some sort of living creature (e.g. a pig and a reindeer) and a pile of ‘turd’, one with the web address www.fart.com (Figure 3). It seems that the children have been aiming at producing funny drawings, largely ignoring the original assignment related to digital portfolio. The four drawings were even produced by using similar kind of and colour drawing pens.

Another evident pair consists of two drawings that include a speaking banana or a speaking apple (‘click and see what happens’), a banana or an apple tree with those fruits and the roots acting as links, jigsaw puzzles and similar elements such as “games”, “write” and “music”. The colours used in the drawings are also very similar (see Figure 4).

The third obvious case is the emergence of the giraffes in the drawings (see Figure 1). Even though the project group gave the giraffe as an example with its eye as a link, there are two drawings so similar that the children must have elaborated their ideas following each other. In both drawings, there is a large giraffe in the middle of the drawing with the spots as links to games, drawing, etc. Both also include a tree on the right and a list of links on the left, including, again, similar links such as “pictures” and “movies”. There are also other links which are almost identical. Actually, a giraffe-resembling feature appears also in the jigsaw puzzle of another drawing (with the speaking apple, see Figure 4 the picture on the right).

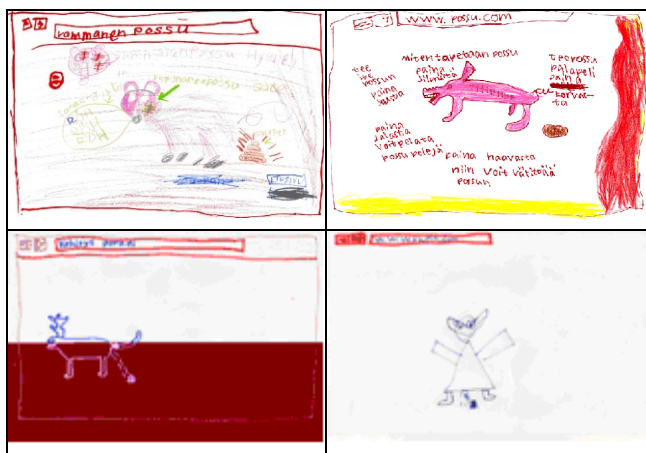


Figure 3. ‘Living creatures with a pile of turd’ pictures drawn by third-graders.

It is also interesting that the children have very creatively combined issues and ideas during the process from a multitude of sources. For example, the giraffe mentioned above appears in two drawings with a very similar place and function (see Figure 1) but in the third drawing it is included as a picture in a jigsaw puzzle (see Figure 4, picture on the right), which again, is a rather popular element appearing altogether in six drawings. This third drawing with the speaking apple, furthermore, shares many elements with the drawing including the speaking banana, but the ‘speaking apple’ drawing actually integrates ideas from numerous sources, not just one particular drawing or example.



Figure 4. ‘Speaking banana and apple’ pictures drawn by third-graders.

The same argument can be related to the different kinds of living creatures with a pile of turd (see Figure 3). In each drawing, the same theme appears, but also with clear extensions or modifications. The animal might be different, the pile of turd may also act as a link to a jigsaw puzzle or the body parts of the animal might act as links in a similar way with the giraffes. Actually, the pig’s ear acts as a link to a jigsaw puzzle in one of the drawings (see Figure 3, picture in the upper right corner), indicating that the ideas are derived and combined from numerous sources. The same applies also to a group of drawings illustrating snowman war, all having certain similar features but also some particular individual characteristics.

One can conclude that at least some of the children have clearly adopted ideas from each other’s drawings, but in a very imaginative and creative ways, combining them, placing them into new contexts and adapting them to different circumstances.

Inspiration from our Technology-Rich Everyday Life

The fact that the children chose web browsers as starting points for their portfolio designs is likely to depend on the instructions. However, the children’s proficiency to use these also displays their everyday multimodal literacy practices in their technology-rich everyday environment. When looking at the drawings it is clear that these children are familiar with computers and the Internet.

The children have embedded in their drawings attributes from three different sources: websites, web portals, and application software. Especially the third-graders use familiar elements of web browsers. They also use other kinds of elements of websites to enliven their drawings: in two drawings there are advertising banners saying “Log in for free to Arkidea” and “Push this now”, “Push now, you have won”. There are text boxes used as links to other web sites typically used by children (e.g., IRC Gallery, Habbo hotel) and as links to games (e.g., “Car games”, “Girls’ games”, “Boys’ games” and “Play”). Some kind of a search service is mentioned in 11 drawings, typically referring to Google (8 out of 11). One of the children has replicated rather clearly the MTV3 (Finnish television channel) web site: the web address is written in the address bar, the links have red background as on the MTV3 site and the links include “Topkani” games (originally in the MTV3 link list) and the Serrano family TV series. It also seems very likely that some of the children are familiar with web portals, as four of the drawings contain elements typical to portals such as weather forecast, chat, e-mail, link to bank account and to the news.

General elements of application software or computers (i.e. operating system/desktop view) can also be found (e.g., the ‘Close/Restore down/Minimize window’ buttons in the upper right corner of the drawing). 13 drawings also have clear borders around them depicting window frames. Two of these even have a scroll bar on the right side of the frame. Two of the children have also drawn the computer desktop to show behind the window with the text “Start” in the lower left corner of the drawing. Finally, eight children have drawn a cursor usually pointing to some link on the drawing.

Computer game elements can be found as well: many children have drawn different kinds of games (for one game, playing instructions are included). In several cases, the games drawn resemble flash games typical to gaming sites. For example, three children have used elements from platform games in their drawings (hearts depicting ‘lives’ and coins for collecting).

When considering the results from the workshop with fourth-graders, it is interesting to notice that none of the drawings were similar to an Internet page. However, it seems that the children have been more successful in understanding the assignment and the concept of ‘portfolio’ as well as the words referring to user interface: ‘buttons’, ‘pictures’ and ‘background’. First of all, only four (of 27) of their drawings could not be considered as ‘portfolios’ at all while all the other results show at least some portfolio type of structuring of different types of study materials. In Figure 2, for example, the first two

pictures have “kansiot” (i.e., ‘folders’) while the one to the right is one of the ‘non-portfolios’ with words such as “music”, “netti” (i.e. ‘net’), “Skype” and “mese” (i.e. Messenger). Half of the drawings (14/27) used some kind of reference to the *Opit* learning environment. Eleven pictures use the exact word *Opit* while three have words very closely connected to that (i.e. connected to the word ‘study’ in Finnish). Eleven (of 27) pictures also use the word “folder”. In addition, almost all pictures have outlined various ‘buttons’ in their design (see the picture on the right in Figure 5). Even the pictures with no clear buttons (see the picture on the left in Figure 5) have some indication for actions when clicking the text. Again, while among the third-graders only one fourth (10/41) could be considered as having some kind of a ‘background’, half (13/27) of the fourth-graders had drawn a colourful background. Finally, quite a few pictures could also be considered as funny or decorative (as was instructed).



Figure 5. Pictures by fourth-graders with ‘buttons’ (left) and without ‘buttons’ (right).

Recycling aspects of the technology-rich environment of children (e.g. web browsers, web sites, or web portals) is not seen equally clearly in the drawings of the fourth-graders. Recycling is more rare and subtle. It is seen in the use of embedded functions (e.g. push a flower and something happens), use of icons (envelopes for e-mail etc.) and imitating the *Opit* environment, as discussed earlier.

DISCUSSION

This study has shed light on the multitude of different types of imitation and recycling in relation to participatory design with children. When the results are considered from the point of view of social action, it may be easier to position these phenomena into their situated and cultural context instead of characterizing them as problematic.

Recycling and imitation in design sessions with children has almost been neglected in the participatory design literature. Some traces of discussion in the field can still be identified. The existing research seems to emphasize the risk of children imitating the adults. This involves a concern on reducing differences in power relationships between children and adults and the children’s tendency to model adult behaviour, anticipating the wishes of the teacher, in particular. This study indicates as well that the children might eagerly adopt the ideas presented by adults in their examples.

The tendency of children to recycle material from each other has been discussed even less in the extant literature. Although there is a mention of possible peer pressure affecting the sessions when working with children in one article (Read et al., 2005), there clearly is a lack of

research on the matter. Some researchers, on the other hand, have emphasized the children’s egocentric tendency to prefer only their own ideas and intolerance to use other children’s ideas (Guha et al., 2004). The age of the children, obviously, needs to be taken into account in relation to this issue. In our study, the children were as old as 9-11 years and, clearly, willing to make use of the ideas of the others.

There also seems to be an apparent lack in the research literature as for the acknowledgement of the effects of the existing technology-rich environment in which the children live their everyday lives. Many children of today are extremely computer literate as they start using technological devices such as mobile phones, computers and the Internet at a very young age and use them as a natural part of their life. Many of their drawings show this familiarity with technology and the Internet and are highly accurate regarding computer use. Isomursu et al. (2010) observe that children value computer literacy skills. By using the elements of technology that are familiar to others (e.g. menus, buttons, icons, and details of web browsers) they demonstrate their computer literacy skills to the adults as well as their peers.

This can be connected with the literature on communities of practice, particularly with classroom ‘communities’ or subcultures, in which the members continuously define and redefine their collective identity as well as the common ways of displaying it. In doing so, the construction of boundaries against outsiders, for example, through the use of specific language expressing membership and status (cf. Lave and Wenger, 1991) is important. The creation of collective identity can be connected to the drawings using elements of online games and Internet gaming sites. By using familiar web addresses, and by creating their own versions of familiar games, for example, children may be expressing their membership in their particular communities or subcultures, and also their ability to express and exchange humour with the other members of the community with their recycled creations, thus generating community cohesion and solidarity. The latter observation is especially visible in the drawings illustrating a sort of living creature and a pile of ‘turd’. These creations can be connected to the construction of collective identity by using a very specific ‘language’ expressing membership: the drawings are very similar to each other but clearly in conflict with the original assignment and with the teacher’s expectations. It seems that the producers of these drawings have, instead, decided to emphasize their membership in their specific reference group. Community cohesion and ‘solidarity’ may be created, maintained and strengthened through humour and other practices, which involve reiteration (Brown and Levinson, 1987; Scollon and Scollon, 2004; Wohlwend, 2008). This may be observable in the aforementioned group of drawings.

Even though the researchers highlight the originality and innovativeness of children’s ideas (i.e. they argue that the children produce ideas the adults could not think of (Druin et al., 1999; Scaife and Rogers, 1999)), it should also be noted that children recycle the materials they have already seen and encountered, including existing

computer hardware and software as well as what is available on the Internet. We suggest that researchers should appreciate this; i.e. they should be aware of the fact that the innovative ideas the children (as well as adults) produce are not created in a vacuum or out-of-the-box, but, instead, they are imitated, adapted or modified from a multitude of different sources. Still, this does not deny the possibility of children (as well as adults) producing highly creative and innovative designs in the design sessions.

CONCLUSION

The findings of this study have some obvious implications for practice and research related to participatory design sessions with children. First and foremost, instead of seeing imitation or adult-child power structures as problematic from the design innovation point of view, this paper shows that, actually, the multiple forms of recycling naturally belong to collaboration with children. Guha and colleagues (2004; 2005) have presented the idea of “mixing ideas”. However, instead of just merging individual ideas, we suggest that the notion of recycling enriches this phenomenon by taking into consideration more diverse and various types of recycling of others' ideas. It is the cycles of discourses in place, the interaction order between participants and the life experiences of the individual social actors that come together in the situation in question (Scollon, 2001; Scollon and Scollon, 2004:19-20).

From the design activity point of view some concrete implications may be proposed as arising from these findings. Recycling could be considered as a resource when planning – or analyzing the outputs from – participatory design sessions. It could be considered as a tool for design both enabling and limiting the design space (Kuutti, 1994: 53). When designing with children, it is most natural to use concrete examples. However, based on our study, we suggest that designers should become more conscious about these examples from the recycling point of view; what types of examples actually help children to be creative in the area that is useful for the design. This also means that when presenting examples, designers (or teachers, etc.) may also influence the session results. At the same time with this power effect, examples also limit the ways in which children would approach design issues naturally, without the given examples. It is also important to note that from a multidisciplinary point of view, some disciplines appreciate the rich data acquired with as little influence as possible, while some disciplines see the value of representations for design innovation. This tension is not trivial since children usually need at least some kind of guidance for the design session, and the given guidance necessarily has some effect on the results of the session.

According to the principles of participatory design, we wish to emphasize the importance of respecting children as design partners. Based on our results, however, when planning participatory design sessions, it is important to become conscious about whom to put working together with whom and why. Working together with friends might lower the unequal power relationships while also

derive more recycling between participants. It should also be noticed that some children already act as idols or role models for others having naturally more power from the recycling point of view. Working with total strangers might lower recycling with peers, yet bringing more individual perspective to the design depending on the other power relations affecting the design session.

Current research also highlights the need to empower children and reduce the influence of potential power imbalance in relation to adults. However, from the design innovation productivity point of view, in addition to effective collaboration and ‘right’ team dynamics, we would also like to emphasize that recycling of adults’ ideas should not be considered merely negative. Vice versa, it could be considered as a potential resource for creative collaboration and in this way it can actually increase children’s capabilities to participate. Perhaps it is not the originality of the ideas that is the most important issue for participatory design sessions to be considered productive.

The twofold nature of recycling is quite an obvious implication of our study. However, we would also like to point out the creative and unmanageable nature of recycling. No matter how well we try to plan for the recycling one should be aware of the limits of this planning. Instead, when analyzing the results, one should avoid jumping into hasty conclusions for design on the basis of frequently occurring shared features. These resemblances between design outcomes might actually not have resulted from joint innovation, but, perhaps, from delicate interactional work between participants to earn a place in the community.

Instead of ignoring the issue of imitation and recycling, practitioners might start to appreciate it; both when planning design sessions as well as when making interpretations and judgments on the basis of the results produced by children, or in close collaboration with children. As an example, the analytical viewpoint of recycling may support practitioners when filtering those aspects of design solutions which really show some exploration of given ideas and innovation. It is also important to discover the technological understanding of the participating children in order to facilitate their necessary transitions for new technologies. Sometimes, for a desired outcome it might be necessary to give the children more preparation in order to make participative sessions more useful and productive.

Finally, from the research point of view, this paper clearly shows the need for multidisciplinary perspectives in order to gain more insights into problems of continuing and complex nature. From the point of view of participatory design with children, we believe that this analysis has also shown what needs to be taken into account when striving for better opportunities for children to have a true impact on design or, in more general terms, in shaping their technology-rich environment. Further analysis of recycling might also reveal some interesting generalizations concerning the exact issues, which children tend to recycle.

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