Playful, Shareable and Creative -
Three Examples for New Directions in User Interface Design

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1 Introduction

Common graphical user interfaces (GUIs) do not support co-located collaborative interactions very well. Novel approaches like tangible user interfaces [1], interactive walls, and tabletop systems [2] meet the users' needs in group interaction situations much better. Good computer support allows face-to-face interaction, offers large surfaces, involves body movements, includes real objects and is smoothly integrated into the users' environment. Especially in learning contexts, many of these affordances can lead to much better tools, supporting kids' activity, fostering creativity, and enabling group communication. In this paper, we discuss our experience in three application domains for the design of novel co-located collaborative learning interfaces: playful learning interfaces for kids, shareable domestic applications and creative work tools. Our current research focuses on the specific requirements of these different applications areas in order to enhance playful, shareable and creative interactions. In each of these domains, we have developed prototypes to support and afford collaborative and creative learning and working environments.

2 Playful Learning Interfaces for Kids

Learning interfaces for kids should meet the children's needs for being playful, creative, and active. Kids are curious about new objects, love to move around, and use their whole bodies. In accordance with constructivist learning theories [3] interfaces for children should support exploring, active engagement, and the usage of form and material. To meet these requirements, we developed a cube as tangible user interface for learning appliances for kids [4]. It contains a microcontroller, several acceleration sensors, a Bluetooth wireless module and a color display on each side. The cube was realized for diverse learning applications for children of different ages: e.g., recognition of the same picture, spatial recognition tasks, math quizzes, word-picture association or vocabulary training. Some of the applications made use of the inherent geometrical mapping of the cube (e.g. the spatial recognition game) whereas others did not (e.g. vocabulary training). We used the cube with children in kindergarden and elementary school (see figure 1).

Figure 1: The Learning Cube. The pictures show children in kindergarden and elementary school using learning applications. The cube encourages group interaction and playful usage.

The cube offered a multiple choice test, showing the question on top of the cube. The other five sides presented possible answers. To choose an answer, the kids turned the specific side of the cube on top and then shook it to confirm the choice. The kids liked the shaking interaction and were curious to see the results,

screaming and jumping when seeing their answers were correct. The cube intuitively supported collaborative activities. The children shared the device by handing it around. The handy and robust appearing of the cube leaded to playful usage.

Interaction between children, helping each other, discussion, and joint problem solving was very natural with the interaction cube. Negotiation who is in control was done in a very similar way as children would do it when interact with toys or physical artifacts. For giving the answers physical exertion was required which leads to an interesting new design parameter. Our early results indicate that children balance physical and cognitive effort. The physical effort required to see if an answer is correct (e.g. how long to shake before this is accepted as an input) influences how long the children think before they try their answer.

3 Shareable Domestic Applications

Another interesting application domain for shareable interfaces is the domestic environment [5]. At home, families and friends tell stories, play games and share photographies or messages. Future interfaces should be designed to meet the needs of these user groups. Good interfaces should not only offer multimedia functions, communication and cooperation mechanisms but also foster creativity and cooperative learning in the circle of families and friends, e.g. within games. Interactive surfaces like walls and tables provide useful platforms for shareable interfaces in domestic contexts. They should be integrated sensitively into the room interior, without having a computer-like appearance, for example as an interactive coffeetable. Embedded into a table, home appliances can stay in the background, supporting the group when needed but not enforcing their attention permanently. We developed a first prototype for a domestic interactive table to support group interaction in private family-and-friends leisure situations (see figure 2). The picture shows two users playing a multi-touch game on a tabletop surface developed in one of our classes on user interface design.

Figure 2: A multi-touch table for
domestic group appliances

4 Creative Work Tools

Being creative is essential for human being. People benefit a lot from creative work tools. Traditional GUI-based tools do not meet the needs within creative work processes very well, especially when it comes to group work situations. Furthermore, in creative tasks and weak-structured workflows, people love to use large surfaces and real material like paper and physical objects. Thus, we should design user interfaces that include real items, allow natural, free, and unstructured ways of interaction and concentrate on the support of creativity. Shneiderman has introduced a generative framework for creativity support tools [6]. Applying this framework, we have developed a tabletop user interface with paper cards for tangible input [7]. The prototype has been designed to support education and research in Art History and focuses on a better integration of digital and real interactions. Real paper cards are connected to digital image data and thus, there is a seamless connection between the two worlds, allowing the users to choose which one meets their current task better. Especially in co-located cooperative learning situations users preferred to work with paper cards on the tabletop surface instead of GUI-based tools (see figure 3).

Figure 3: A paper-based tangible user interface to support creative work

5 Conclusions and Future Work

In this paper, we introduced prototypes in three different application domains: playful learning interfaces for kids, shareable domestic applications and creative work tools. We believe that these three application areas benefit a lot from new directions in user interface design, especially focusing on co-located and cooperative learning. Tangible user interfaces and interactive surfaces offer big potentials for the support of playful, shareable and creative interaction. In order to push forward research on user interface design in these areas, analyzing the specific requirements of children, domestic and creative work and learning environments will be important. One focus should be on the understanding of the roll of embodiment and movement in playful learning tasks. Furthermore, the development of silent and well embedded appliances that support private group interactions in domestic environments should be among the future activities. Third, the design of open tools that can easily be adjusted to different creative group usage scenarios and offer opportunities for seamless integration into other appliances is an important topic. These activities should lead to design frameworks of shareable technologies. As playfulness, shareability, and creativity are essential qualities for human being, they should build a starting point for new directions in user interface design.

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