Six Applications for Interactive Tabletops

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Abstract: In this workshop session, I will give a hands-on demonstration of six applications that have been developed as part of the ShareIT project to research how children and adults collaborate with interactive tabletops.

Six Applications

Since 2007, the ShareIT project has been investigating how a new group of shareable technologies can support co-located collaboration. One major research focus has been on supporting and investigating children's collaboration using an interactive tabletop for a variety of tasks. We have been using the DiamondTouch tabletop (Dietz and Leigh, 2001), which not only accepts multiple touches but also identifies who made which touch. What follows is a brief introduction to six applications that were created as part of that work.

DigiTile is an adaptation of DigiQuilt to an interactive tabletop (Rick and Rogers 2008). Like DigiQuilt, DigiTile is a construction kit for learning about math and art by designing colorful mosaic tiles. In addition to being aesthetically pleasing, these tiles lend themselves to mathematical analysis. The designs embody fraction and symmetry concepts. For instance, the design in Figure 1a is half red and half yellow; it is also rotationally, horizontally, and vertically symmetric. When using DigiTile, two learners collaborate on increasingly difficult challenges, such as creating a design that is half red or creating a design that is horizontally symmetric (Rick, Rogers et al., 2009).

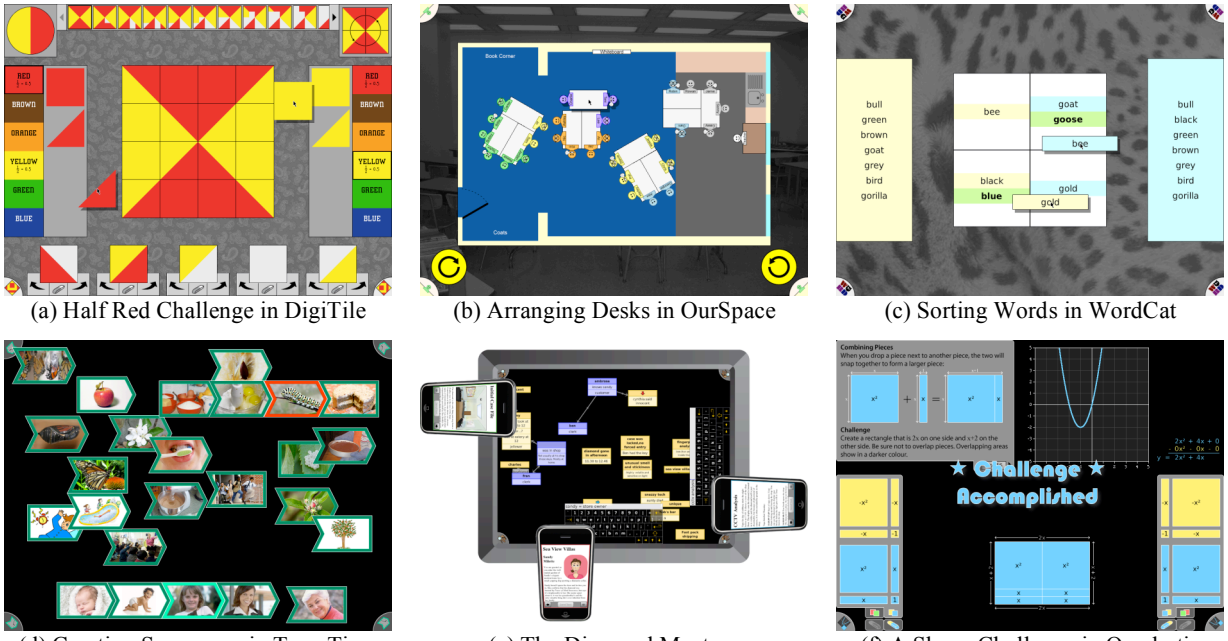
OurSpace was developed to study how children use an interactive tabletop to complete a design task that is both engaging (the children find the task intrinsically motivating) and challenging (it is relatively difficult to arrive at an acceptable solution) (Marshall et al., 2009; Rick et al., 2010). In the research study, groups of three children worked together to position desks in their classroom and to seat students around those desks (Figure 1b). Each group completed the task twice, once in single-touch mode and once in multiple-touch mode. In single-touch mode, only one participant could interact with the interface at a time. In multiple-touch mode, all three could interact simultaneously. By comparing across the two conditions, we were able to investigate the value of concurrent use for issues of engagement, use, gender differences, and equity of participation (Harris et al., 2009; Rick, Harris et al., 2009; Fleck et al., 2009).

WordCat is a word categorization task. Two users place twelve words into a two-by-two table (three words per cell) to arrive at labels for the rows and columns. In Figure 1c, the rows are animals versus colors and the columns are words that begin with b versus words that begin with g. WordCat uses the interaction mechanism of *SCoSS*—separate control of shared space (Kerawalla et al., 2008). Each user has the same set of words but can only move their own. The left user controls yellow words; the right user controls blue words. When both a yellow and a blue word are dropped in the same cell, one bold green word shows up to indicate the agreement.

TransTime is a pattern game for 5–6 year olds to engage how time progresses. Two children work together to place twenty-five puzzle pieces into five sequences (Rick et al., 2010). Each sequence exemplifies a different notion of time progression that children should be familiar with: 1) the butterfly life cycle, 2) human life from infant to old age, 3) from seed through bud to tree, 4) activities during a typical school day, and 5) making a cake from ingredients. Learners are given feedback to evaluate their solutions in two ways. First, each tile is associated with a unique musical note: The instrument indicates the sequence, while the pitch indicates the position within the sequence. Second, correctly placed tiles highlight in green and incorrectly placed tiles highlight in red (Figure 1d).

The Diamond Mystery is a *collaborative game* (players work together instead of competing with each other) developed to understand how configurations of shareable and personal devices affect the way people share information and, in turn, are able to collaborate in order to achieve a shared goal. Moving around the game board, three amateur detectives collect clues necessary to solve the game. Each detective receives his or her respective clues on an individual handheld device (iPod touch). To facilitate the creation of a shared external representation, we provide a multi-user concept mapping software (Figure 1e).

Quadratic is a virtual manipulative for two learners to explore algebraic equations on an interactive tabletop. It is based on a physical manipulative reported on by Bruner (1966). The virtual version adds several important features: 1) negative pieces; 2) multiple palettes; 3) multiple linked representations between the visual elements, the equivalent algebraic expression, and the graph of that expression; 4) the ability to provide feedback on posed challenges (Figure 1f). It thus significantly expands the educational scope of the manipulative.



(a) Half Red Challenge in DigiTile (b) Arranging Desks in OurSpace (c) Sorting Words in WordCat

(d) Creating Sequences in TransTime (e) The Diamond Mystery (f) A Shape Challenge in Quadratic

Figure 1. Six Interactive Tabletop Applications

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