Teaching Table

a tangible mentor for pre-kindergarten math education

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Presentation Summary

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6. Teaching Table and its features
7. Research Prototype and Mentor Tools
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9. User Studies
10. Future work

Total Time: 18 min
Motivation & Research

- Early Childhood education
  - Use of physical objects should be given preference - Piaget's theory of intellectual development
  - Learning in very young children
    - Through firsthand experience with things, people, and feelings
    - Depends on senses of vision, hearing, touch, smell, and taste

- Developments in tangible computing
  - Advances in digital manipulatives to combine the interactive properties of the computer medium and physical objects

- Other factors in pre-K education
  - The growing workload of pre-K teachers and push for higher quality standards creates a need for assistive tools for teachers
Solution

Create a tangible interaction platform as a solution for early childhood learning in classroom environments
Goals

- Physicality
- Interactivity, and
- Support for curriculum practices & assessment
Related Projects
(computationally enhanced learning toys)

**TICLE** (Tangible Interfaces for Collaborative Learning Environments) at the Goudreau Museum of Mathematics in Art and Science - Tangram puzzles, scaffolding technique

**ActiveCube** in action - Shape selection from several candidates, building 3D objects

**Wireless Generation** assessment tools for teachers
Related Projects
(interactive tabletop systems)

**TViews** - acoustic tracking based interaction platform for shared living spaces

**Sensetable** - electromagnetically tracking pucks and coupling visual feedback
Research Phases

- Researching similar projects to learn from other’s experiences
- Observing the present learning environment practices at actual pre-K schools
- Design and development of the table based upon knowledge gained from the steps above
- Testing the artifact developed in real classrooms and refinement
The Teaching Table

• Easy-to-use table top device
• Tangible engagement
• Coincident visual and audio output
• Interactive activities
• Scaffolding
• Assessment tools for teachers
Table Prototype

- **Hardware**
  - Sensing: Zowie’s Electromagnetic technology
  - Coincident display: Flat panel LCD screen
  - Standard PC

- **Software**
  - Implemented in Java
  - Interactive activities: Five categories for math education
  - Assessment tools
Mentor Tools
(screens)

Teaching Table Computer Interface
(for teachers)

Activity Control
Performance Tracker

Teaching Table - Activity Selection
Please Select an Activity:
-- Activities --

PLAY  PAUSE  STOP

Teaching Table - Student Records
Select or Add Student:
Sample Name
Add Name to List

Overall Performance displays the summary of the performance of a student in all the activities in which he or she has participated.

Student Name: Sample Name
Number of Activities: 6
Average Time: 2:30 min (Class Avg: 2:15 min)
Number of Errors: 3 per activity

Activities Completed:
Number Activity 1
Pattern Activity 2
Sorting Activity 1
Sorting Activity 1
Sorting Activity 2
Geometric Activity 1

Shortest Activity: Number Activity 1 (2:00 min, Class Avg: 1:30 min)
Longest Activity: Sorting Activity 1 (3:15 min, Class Avg: 3:15 min)
Min. Number of Errors: Number Activity 1 (0 errors)
Max. Number of Errors: Sorting Activity 1 (3 errors)

OK  Cancel  Save As...
Demonstration Videos

Table + Number Activity
Counting Activity
Scaffolding
User Studies

- School Visits
  - Centennial Place Elementary School
  - Volunteering, observing classroom environment

- Focus Groups
  - Involving pre-K teachers
  - Group discussions on topics of technology in education and assessment

- Usability Study
  - Involve pre-K students in pre-assigned activities
  - Performance in the activities and observations made during the study will inform the modification process of the table
Future Work

- **Enhancements**
  - User study to remove usability defects
  - Improvements in the construction of the table
  - A more robust sensing technology
  - Embedded computing hardware

- **Extensions**
  - Additional activities to include more subjects
  - User evaluation with assessment tools
  - Collaborative activities for children?
Thank you!

Questions?