Teaching Table

a **tangible** mentor for pre-kindergarten math education

Tangible and Embedded Interaction, 2007

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Presentation Summary

Total Time: 18 min

1. Motivation & Research
2. Inspiration
3. Goals
4. Related Projects
5. Research Phases
6. Teaching Table and its features
7. Research Prototype and Mentor Tools
8. *>Demonstration Videos*
9. User Studies
10. Future work

Motivation & Research

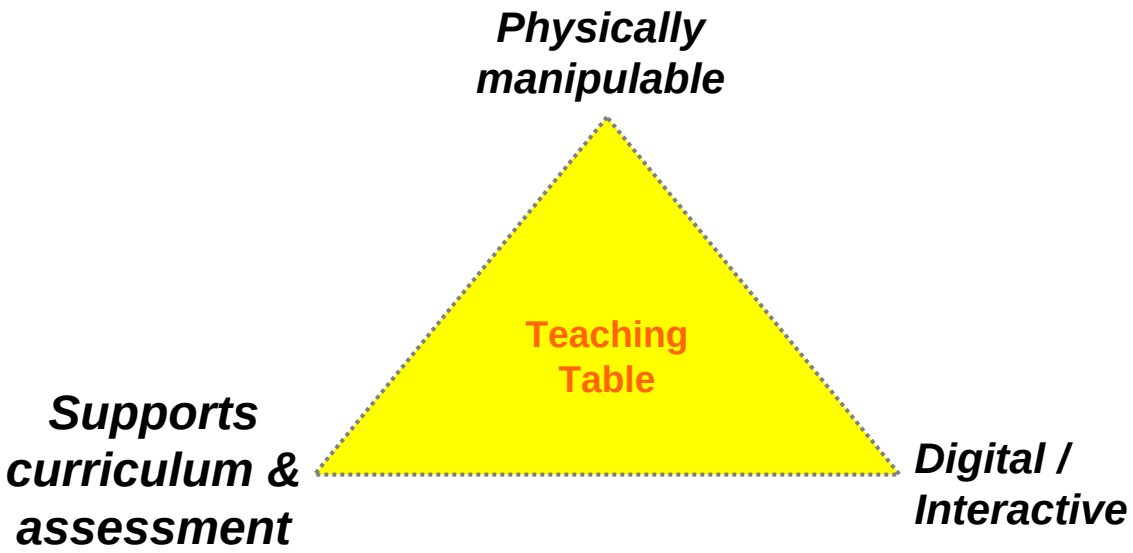
- Early Childhood education
  - Use of physical objects should be given preference - Piaget's theory of intellectual development
  - Learning in very young children
    - Through firsthand experience with things, people, and feelings
    - Depends on senses of vision, hearing, touch, smell, and taste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

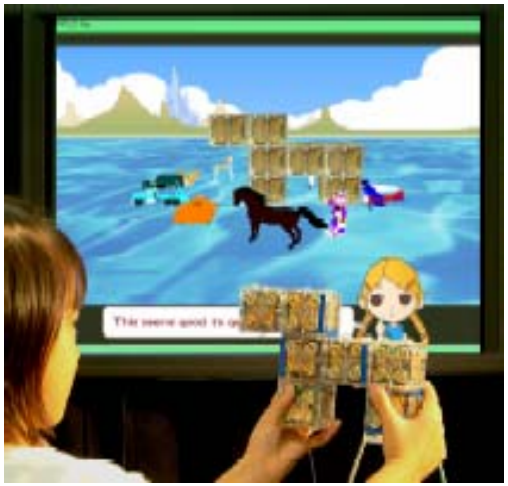
- Physicality
- Interactivity, and
- Support for curriculum practices & assessment



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



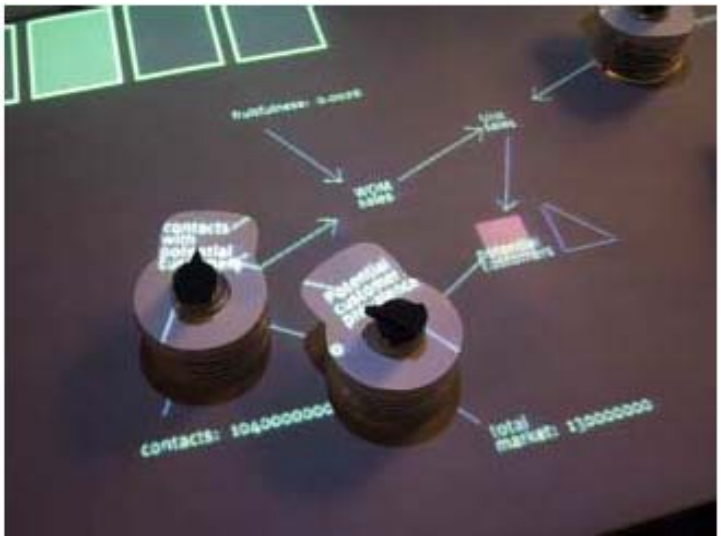
ActiveCube in action - Shape selection from several candidates, building 3D objects

Wireless Generation assessment tools for teachers

Related Projects

(interactive tabletop systems)

TViews - acoustic tracking based interaction platform for shared living spaces

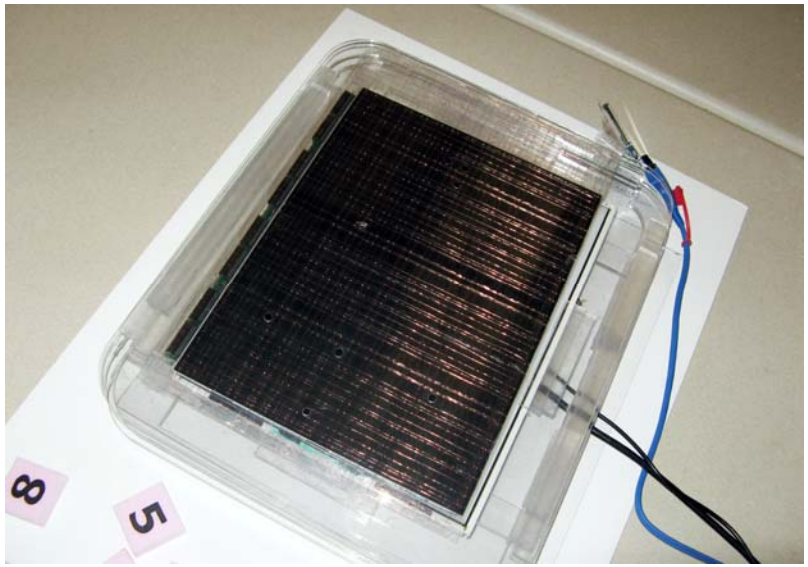


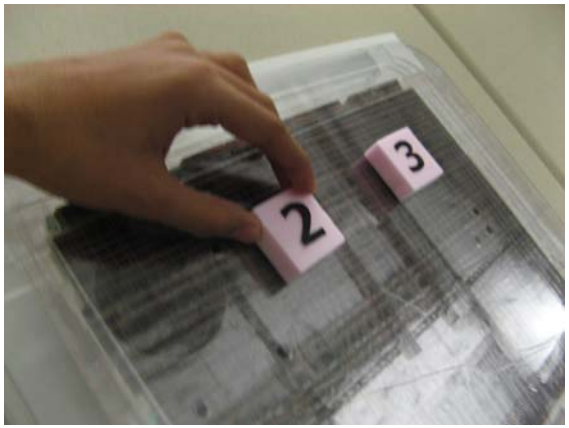
Sensetable - electromagnetically tracking pucks and coupling visual feedback

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

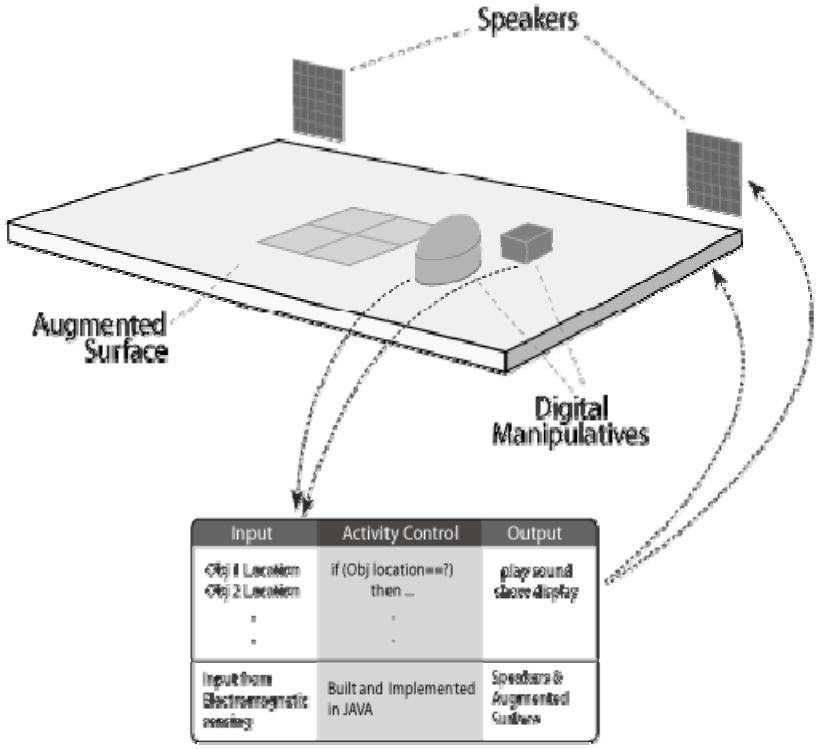




- Easy-to-use table top device
- Tangible engagement
- Coincident visual and audio output
- Interactive activities
- Scaffolding
- Assessment tools for teachers

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



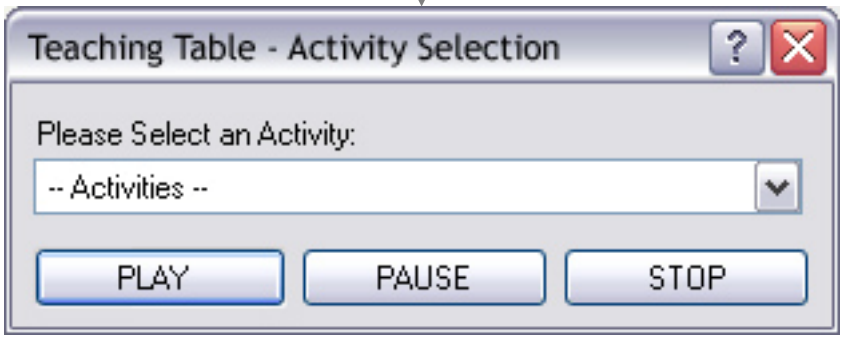
Mentor Tools

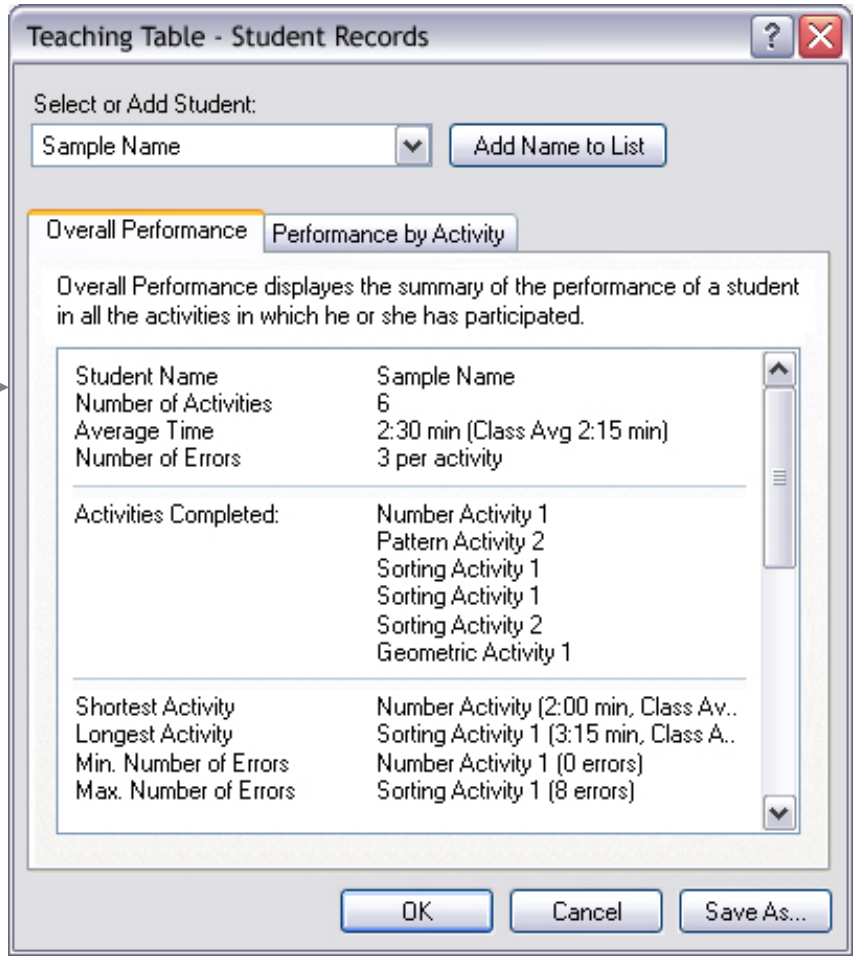
(screens)

Teaching Table Computer Interface
(for teachers)

Activity Control

Performance Tracker





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?