

Collaborative Creation of Knowledge Artifacts in an Outdoor Environment for Young Children

Gene Chipman, Allison Druin, Mona Leigh Guha, Jerry Alan Fails, Wayne Churaman

University of Maryland
Human Computer Interaction Lab
College Park, MD 20742 USA
+1 301 405 7027
gchipman@cs.umd.edu

ABSTRACT

This poster summary describes research that investigates the use of mobile technologies to support young children's collaborative artifact creation in outdoor environments. Collaboration while creating a knowledge artifact is an important part of children's learning. Key aspects of supporting this process outdoors are discussed. An approach is outlined that uses mobile computers for artifact creation and computational enhancement of tangible flags that connect artifacts to environment. Preliminary results of cooperative inquiry design with children are presented.

Keywords

Children, collaboration, cooperative inquiry, mobile devices, tangible interfaces

INTRODUCTION

Outdoor field trips give children the opportunity to explore an authentic context. Iterative processes of collaboration and creation of written descriptions can help focus observation and promote interpretation and reflection. Current classroom practice is to have children collaborate on the creation of a representational artifact, like a report or poster, using knowledge gained from context. But no further exploration of the environment can occur in the classroom. Synthesis and representation of knowledge are removed from the context in which it was gained. Construction of an explicit representation [6] and collaboration in an authentic context [3] are both important aspects of learning, but a separation exists between these two processes. This research investigates the use of technology to support children (grades K-4) in creating artifacts to represent their environment while exploring.

Related Work

Researchers have used portable computers as data collection tools that promote and support older (grades 5-8) children's inquiry of the environment [4,8]. These tools help children connect abstract information to the real world during both outdoor exploration and classroom synthesis. Use of digital

augmentation to further promote inquiry suggests that automated presentation of information is inferior to allowing children to initiate inquiry [8]. Tools that make the actions of an individual obvious promote awareness of activity amongst collaborators [7]. Use of walkie-talkies for remote collaboration has been shown to promote inquiry [7], but also can be disruptive [2]. Such work does not address younger children.

Research with younger children (grades K-4) that supports artifact creation through drawing and story telling [5,9] has demonstrated the importance of mobility and tangible interfaces in fostering collaboration. Tangible interaction is well suited to younger children because of its physicality. This work does not support children in connecting their artifacts to the real world and it is designed for indoor use.

APPROACH

A child with a portable, wireless computer can draw a picture or take notes of something interesting in their environment. The child can then attach a tangible flag to a real world object. Tangible flags can be scanned using an optical barcode or radio frequency identification, thus linking the artifact to the flag when the artifact is transmitted to a server via a wireless network. Such a tangible interaction is appropriate for young children and the physical act of attaching a flag and scanning it may reinforce the link between artifact and environment.

Because tangible flags are readily visible, they support the awareness of collaborators by making the object of a child's interest obvious to all. This enables other children to access the artifact by using the same tangible interaction of scanning the flag. Children can have control over creating and viewing the digital augmentation of the environment and the mobility to explore together or individually.

This approach provides a framework for children to explore an outdoor environment and augment it with digital artifacts they have authored. Design issues include appropriate ways to support children's communication and interfaces to allow children to combine and create digital artifacts together.

RESEARCH METHOD

For this research, adult researchers and children work as partners in design teams using cooperative inquiry methods [1]. The work is being done with two design teams; one

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with six elementary school children (ages 7-10) and the other with a class of kindergarten children (ages 5-6).

Preliminary Research

The first sessions with both teams were mock field trips. Groups of children observed plants outdoors and took notes or drew pictures on paper. Each group used their own color of tangible flags to mark their findings. The flags were not computationally enhanced. The goal was to see the impact of tangible flags on children's collaborative effort and ability to re-locate or elaborate on their findings.

In the second sessions, two groups of children collaboratively searched for different colored objects in order to solve a puzzle. Each group could not take certain color objects and instead had to help the other group locate those objects. Groups used a walkie-talkie to communicate with each other. The goal was to investigate the children's collaboration to locate objects in a large physical space and the impact of walkie-talkie communication on awareness.

Sessions were followed by a discussion of the experience and brainstorming on ideas to improve the experience.

Discussion

The specifics of marking the environment were important to the children. Children discussed within their group the precise location to be marked and asked adults to mark locations they could not reach. Some younger children included the flag in their picture. Flags also provided the children with awareness of exploration efforts by showing the locations of their own and other's exploration. Children sometimes observed and added their own flag where another group had previously placed a flag.

It was difficult for the children to exchange location information using walkie-talkies. However, communication supported awareness of the other group's activity. A common request was the other group's location. Children announced the finding of the other group's objects. This led to groups meeting face-to-face at the location of an object. Children coordinated their search efforts and reported results to the other group via walkie-talkie.

Some ideas generated from these brainstorming activities included: active maps that showed the location of others and paths of exploration, automated connection between notes and flags, and email or instant messaging.

Future Work

Further research will implement the automated connection of artifacts to environment with portable computers and computationally enhanced flags. Using flags with a unique appearance, such as shape, color or symbol, can provide a better way for children to reference artifacts. Automatically placing an icon of the flag into the digital artifact may further reinforce the connection for younger children.

Communication via email and instant messaging will be investigated. Active maps can support exchanging location information. The discovery of flags can be used as a method of initiating communication and this may help focus collaborative effort on artifacts and the environment.

Enhanced tools for collaboration could allow drawings to be made into a story or be combined into a larger drawing. Creating connections not only between artifact and environment, but also between artifacts representing different parts of the environment, may enable children to explore and explain relationships in the real world.

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