Nurturing Learners’ Communities by Creating and Sharing Maps

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Summary

Creating and sharing maps for nurturing learners’ communities

- **Collaborative learning by integrating outdoor learning and classroom learning** in primary education.

- The SketchMap system for **supporting children in creating maps in an outdoor environment** and for **sharing them in classrooms and homes**.

- **Teachers, parents, and people in local communities participate in** the map creation tasks.

- The project is in progress --- SketchMap has been evaluated in the class of “Safety Map”.
Overview of this talk

- Motivation & Background
- Key Ideas
- System Configuration of SketchMap
- Design Issues
- Implementation Issues
- Evaluations
- Conclusions & Future Works
ITL @ Univ. of Tokyo

• Designing systems for supporting collaborative learning
• Using mixed reality, mobile, ubiquitous, and robotics technologies
• *Enhance learners’ experiences* through interactions with people, artifacts, computational media in the real world

(http://www.itl.t.u-tokyo.ac.jp/projects.html)
Motivation & Background

- Mobile and ubiquitous technologies allow people to learn anywhere & anytime in an appropriate context → *situated learning*

- Learning is not a momentary activity: *Enhancing learners’ experiences* and utilizing them as opportunities for further learning are effective for raising their motivation and engagement.

- *How to design a support system for children using mobile & ubiquitous technologies* in order to make learning a lasting activity.

- Evaluations in a realistic setting: educational practices in school education.
Key Ideas (1)

For nurturing communities

– **Involvement of** not only *children* but also their *teachers, parents and people in a local community.*

– **A map as a media for supporting** children’s *learning and enhancing communication* between children and people around them

– Sharing the goal: *support children’s learning about scientific and local community issues (e.g. nature, security)*
Key Ideas (2)

SketchMap for supporting outdoor/classroom learning

– Map Drawing: The basic idea of SketchMap is that children’s experiences are augmented by articulating and recognizing the real world, and by expressing it through sketching.

– SketchMap enhances conventional children’s fieldwork by using a tablet PC that retains the features of pen-based interactions.

– SketchMap allows children to reflect their activities through their maps created during their fieldwork, and to share and edit them collaboratively in their classroom/home.
Demo Video

Six graders using the SketchMap client in a “safety map” class
SketchMap: System Overview

Outdoor Learning
- Drawing a map using a stylus
- Capturing a real world object as an image, a sound, or a movie

Classroom Learning
- Individual learners' activity data
- Sharing, reflection and annotation

GPS signal
- Wireless Internet

Tablet PC augmented with a USB camera and a GPS receiver
Design Issue (1)

Client (to be used outdoors)

- Learners’ experiences are augmented by articulating and recognizing the real world

  sketching that retains features of pen-paper interactions

c. Drawing a map with a few cartographic symbols

a. Marking on an existing map

b. Placing various icons

Cited from http://www.justsystem.co.jp/
Client (cont.)

- To reflect their individual experiences or to quickly represent details of real world objects, sketching is not always an effective method.
- Capturing real world objects as a image, a sound, or a movie by using a digital camera or a voice recorder should be provided as an option.

- The SketchMap client allows learners to capture their experiences using both methods.
Design Issue (3)

Server (to be accessed in a classroom, a home, …)

- Learners’ outdoor experiences (i.e. maps created by individual learners) are stored and shared among the learners.
- Learners can individually *reflect their map creating processes*. (e.g. A learner can recall when he took this photo or where he drew that street)
- Learners can collaboratively modify their maps or add new information on them through a web browser, in face-to-face or distributed situations.
- *Teachers, parents, and people living around a school can access the server and annotate on the maps*
SketchMap: Client

Hardware setting

GPS antenna
USB camera
tablet PC
GPS receiver

User interface

(B) User interface
(C) User interface
(D) User interface
SketchMap: Server Interface

Learners can share their maps and annotate them through a web browser.

A route of individual learners’ fieldwork was overlaid onto a “real” map.
SketchMap: Implementation

Client
- Software implemented by J2SE 5.0
- tablet PC + GPS receiver + USB camera
- Logging module: stroke by stroke with time & location data
- A map stored in the SVG format and transferred to the server in the XML format

Server
- AJAX
- Apache + XML database (eXist) + XQuery
- Replay software for reflection
- Google Map API
Educational Practices

– The SketchMap has been evaluated in the following classes in an elementary school (More than 200 children, from February 2006 to July 2007):

  – Safety Map Class
  – Nature Exploration Class
Safety Map Class: Overview (1)

- Conventional map creation class in primary education curriculum using a pen and a paper.
  - Create a big map by putting individual children’s map together
  - Learn the basic concept of cartography through tasks of drawing maps around a school.

- Why safety map?
  - Recent tragedies in Japan while children were commuting
  - An emergent message from Japanese Ministry of Education: making school secure and protecting children
    (http://www.mext.go.jp/b_menu/houdou/17/12/05120900/007.htm)
Safety Map Class: Overview (2)

– Serious concern and strong request from schoolteachers and children’s parents: raise children’s awareness of safety and danger while commuting

– In the safety map class, individual children create a map around their school from their viewpoint.
– They learn with each other by sharing and annotating on their own maps.
– Teachers, parents and people living around the school will voluntarily help children in creating the maps.
Safety Map Class: Experimental Setting (1)

- Date: June-July, 2007
- Location: Kashiwa city, Chiba, Japan
- Participants: Elementary school children (age: 11-12). 75 were divided into 15 groups of five.
Safety Map Class: Experimental Setting (2)

[Time schedule]
- One day for outdoor fieldwork using a SketchMap client
  - 90 min. fieldwork + 45 min. presentation (3 min. per group)
- Three weeks for reflection and collaborative map annotation using the SketchMap server

[Evaluations]
- Video analyses, questionnaire, server access log, etc.
Research Questions

(1) Usability of SketchMap (the client in an outdoor environment)

(2) How outdoor activities motivate children for their collaborative learning in their classroom/home?

(3) Level of the participation of parents and people in a local community by sharing maps
Evaluations – Usability of client (1)

Through the questionnaire, children could easily use the SketchMap system.

Q1. How was your experience with SketchMap?
- Very good: 65
- Good: 9
- Neutral: 0
- Bad: 26
- Very bad: 2

Q2. Easy for you to use SketchMap?
- Very easy: 29
- Easy: 21
- Neutral: 15
- Difficult: 2
- Very difficult: 3
- No answer: 2

Q3. Did you easily understand maps drawn by others?
- Very easy: 14
- Easy: 11
- Neutral: 23
- Difficult: 2
- Very difficult: 3
- No answer: 12
Evaluations – Usability of Client (2)

- Five children in each group voluntarily discussed and decided their individual roles (e.g. capturing with a camera, drawing a map, discovering an object to be captured, managing individual children's tasks, etc.) and changed them halfway through their task.

- Using a tablet PC in an outdoor environment was sometimes difficult for children due to the weather.
Evaluations – Integration of Outdoor/Classroom Learning

– Classroom/home learning through a web browser:
  The total number during the three weeks was 29, which seemed relatively small.

– One of the main reasons was that schoolteachers did not use the SketchMap server in their class
Evaluations – An Example of Communication through Maps (1)

Four children (C1, C2, C3, C4) and one teacher (T1) tried to enumerate potentially dangerous places by referring to a certain part of the map and photos there on the server.

C1: This parking lot seems dangerous, because suspicious individuals can easily hide behind cars. We might be attacked while commuting.

T1: A location behind the step of the apartment house (next to the parking lot) is also dangerous, because it is dark and difficult to be recognized.

C1: There are a bush and a hut (around the parking lot) that allow suspicious individuals to hide.

C2: Suspicious individuals can easily enter these places, and we cannot recognize them when it becomes dark.

T1: This photo (on the map) shows the parking lot taken at a distant location.

C3: I think it is very dangerous because cars parked there make us difficult to identify suspicious individuals.

C4: That location (behind the step of the apartment) seems dangerous because it is dark and (the wall of the apartment is) covered with graffiti.
Evaluations – An Example of Communication through Maps (2)

• C2 and C4 again walked by the parking lot and found new information that they had not found during the fieldwork.

• *Active discussions among the children happened* because they really (re)visited the place and recorded things of their interest for creating a map, and therefore, had a certain level of knowledge about the place.

• Teachers’ role is important: some annotations by children are not appropriate (a kind of calumny) → teacher as a moderator
Evaluations – Nurturing Communities

Not successful at the moment!

• More participation by children is necessary
  In the next experiment, a curriculum that utilizes the SketchMap server and relates their classroom activities to their outdoor activities will be designed to make children actively participate in the annotation tasks.

• Parents’ participation was few
  – Parents were not well informed about the experiment or the server’s URL (The parents could know about the experiment only from their children)
  – Probably, parents hesitated to add comments because they did not always want to make their comments visible to the other children and parents.
Conclusions & Future Works

– SketchMap: A system that integrates outdoor and classroom learning
– Evaluations in outdoor sessions were positive
– Map as a media for nurturing communities, but …
– More improvement in the system design (the analyses of the experiment is in progress)
– Long term evaluations to confirm effects of SketchMap (collaborative learning by children, nurturing learners’ communities through maps, and so on)
Thank you for your attention!