

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”.



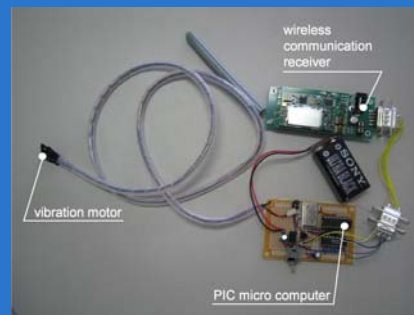
Overview of this talk

- Motivation & Background
- Key Ideas
- System Configuration of SketchMap
- Design Issues
- Implementation Issues
- Evaluations
- Conclusions & Future Works

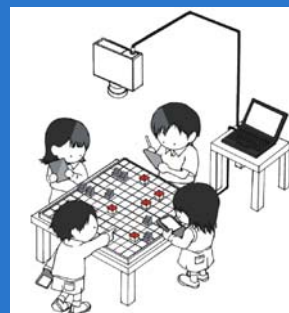
ITL @ Univ. of Tokyo

- 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>)



T-RHYTHM @ WMTE2005/CHI2006



Caretta & CarettaKids @ CHI2004/IDC2006



CoGAME @ SIGGRAPH 2007

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.***



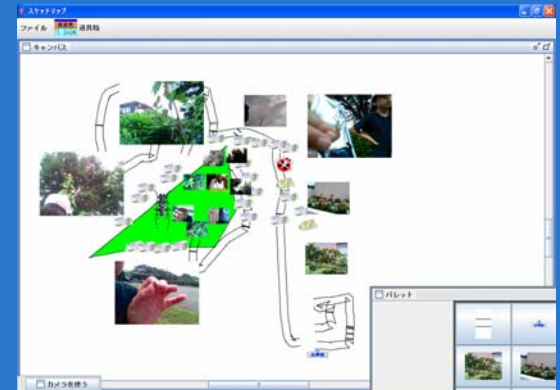
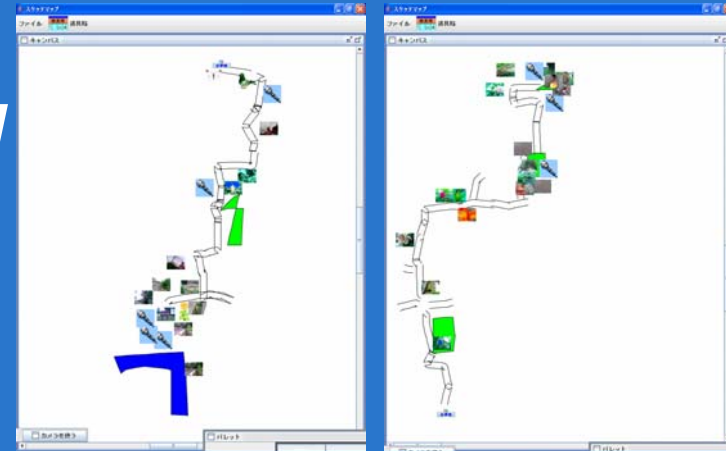
- ***How to design a support system for children using mobile & ubiquitous technologies*** in order to make learning a lasting activity.
- Evaluations in a realistic setting: educational practices in school education.



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)



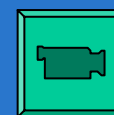
Key Ideas (2)

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.***

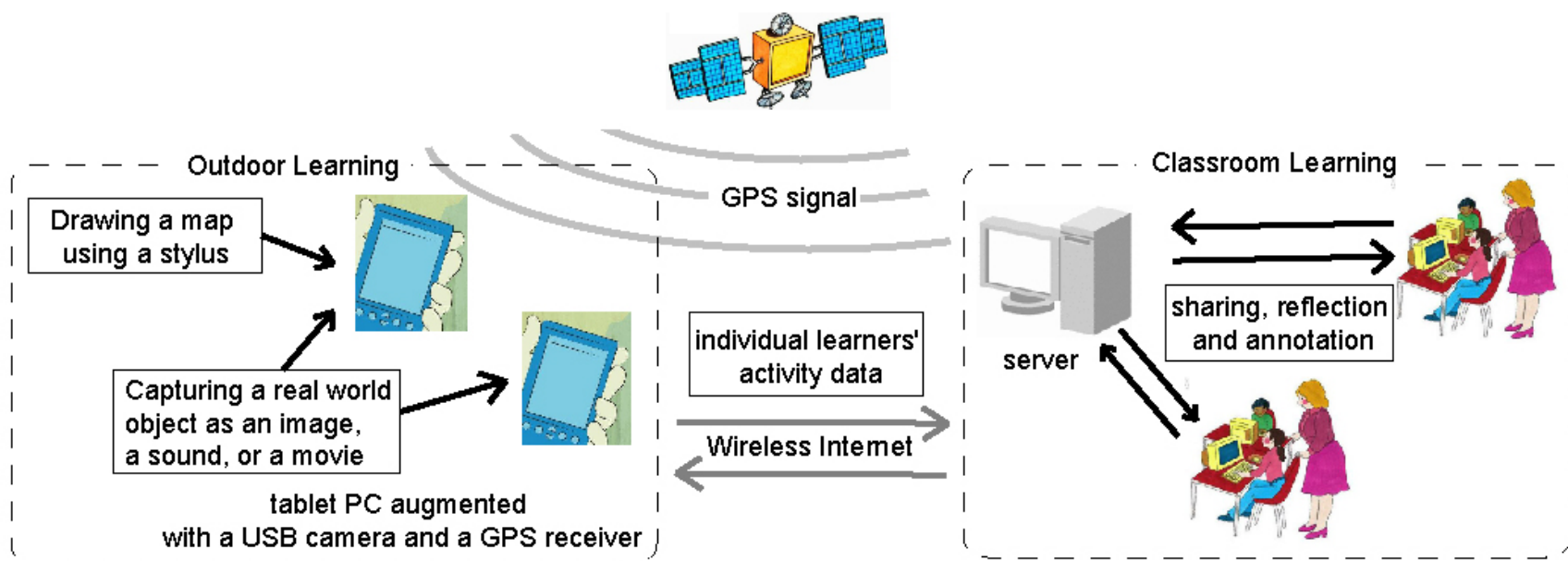


Demo Video



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

SketchMap: System Overview



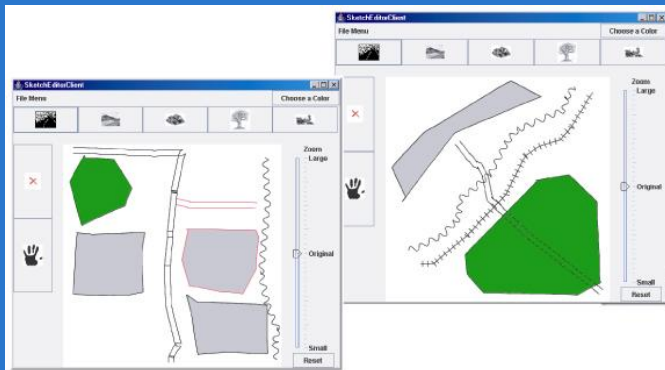
Design Issue (1)

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/>

Design Issue (2)

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.

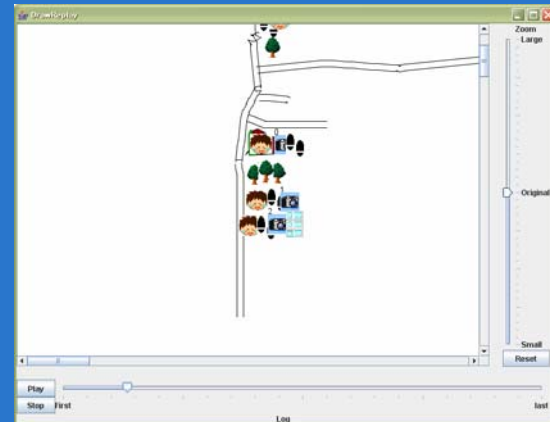


- The SketchMap client allows learners to capture their experiences using both methods

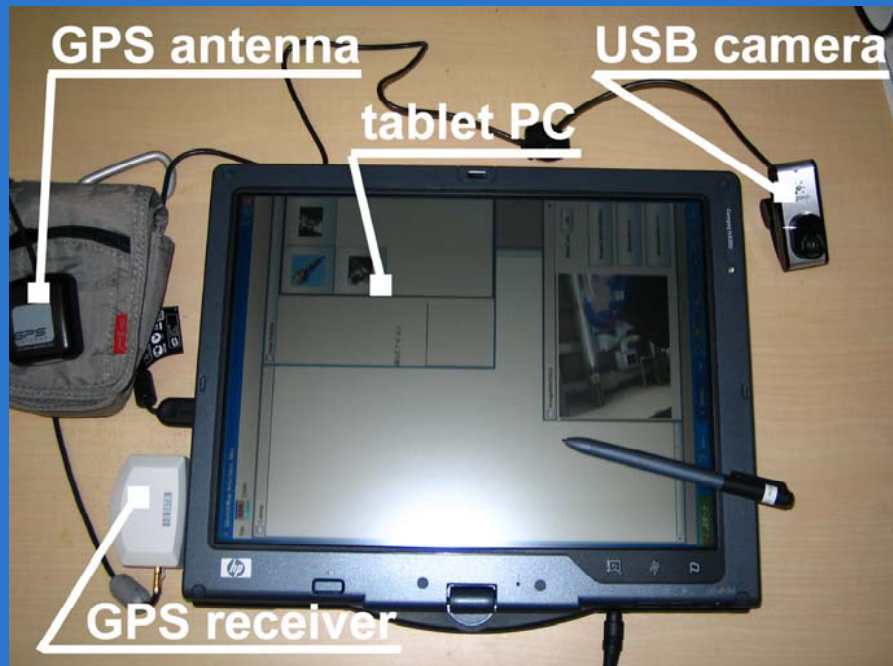
Design Issue (3)

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

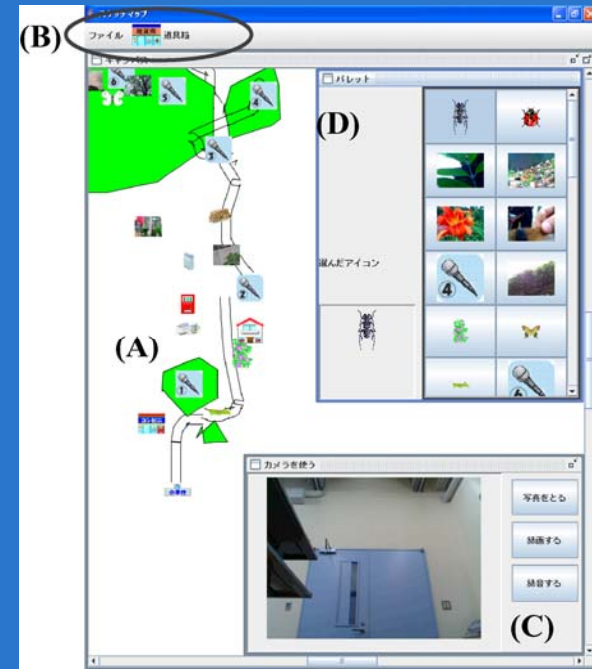
- Learners' outdoor experiences (i.e. maps created by individual learners) are stored and shared among the learners.
- Learners can individually ***reflect their map creating processes.*** (e.g. A learner can recall when he took *this* photo or where he drew *that* street)
- Learners can collaboratively 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

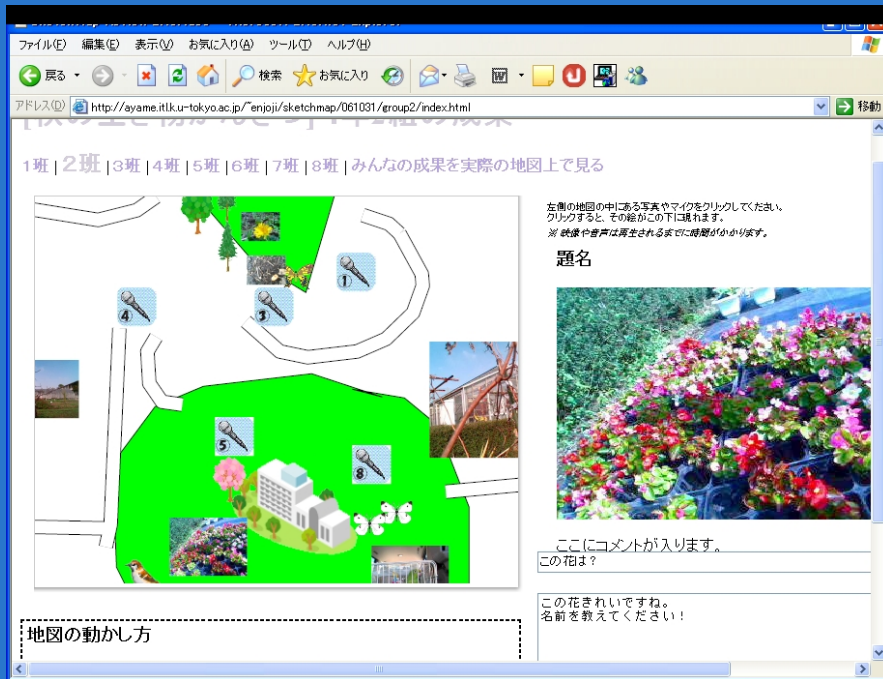


hardware setting



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.



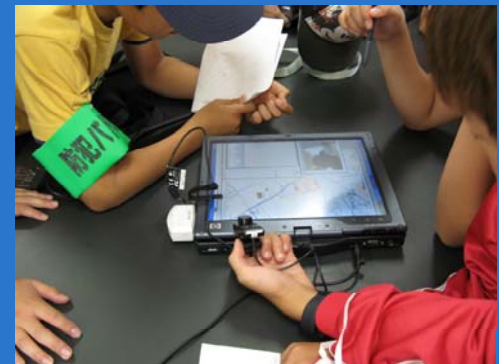
Safety Map Class: Experimental Setting (2)

[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.



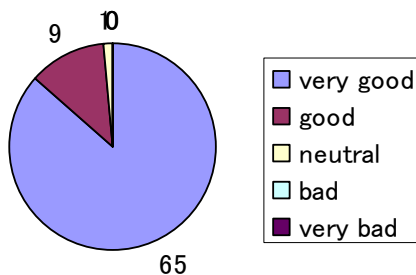
Research Questions

- (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

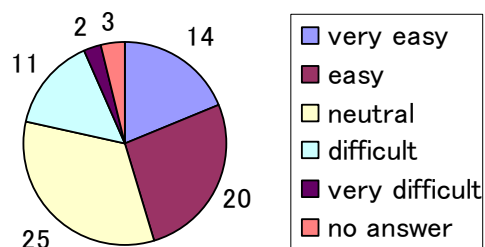
Evaluations – Usability of client (1)

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

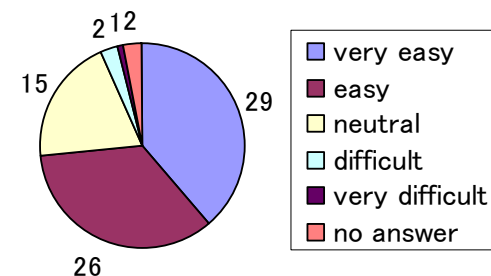
Q1. How was your experience with SketchMap?



Q2. Easy for you to use SketchMap?



Q3. Did you easily understand maps drawn by others?



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.

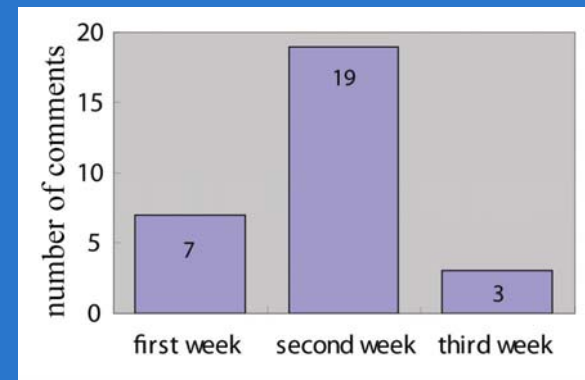


Evaluations – Integration of Outdoor/Classroom Learning

- 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!