Analysis of an informal mobile learning activity based on activity theory

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Introduction to the study

- Objective:

  Study and understand a learning activity in which students collaborate with each other with the help of a facilitator in a mobile technology supported learning activity in a museum

- Context
  - *Historical Museum*
  - *The majority of the exhibits are paintings and personal objects of historical Greek persons of the 18th -19th century*
  - Direct interaction not available
  - Available content consists of texts with information about the exhibits
- Technology used
  - Pocket PCs, RFID Tags & Readers, Wi-Fi

Specific goals supported by the imposed technology:

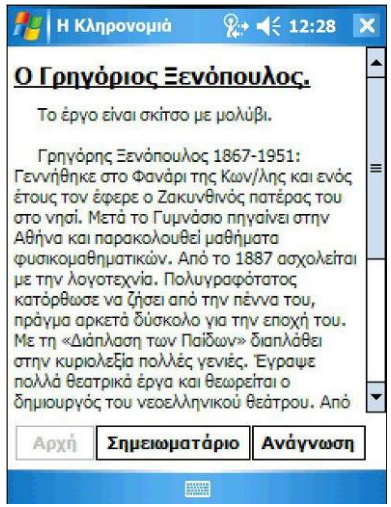
- ✓ Highlight the inherent historical interrelation between various exhibits
- ✓ Provide a way of deeper interaction with the exhibits
- ✓ Design a narrative to integrate the required historical information into a meaningful story

Scenario of the learning activity

- A historian working for the museum hides his will in his favorite exhibit
- *Students are asked to help the people of the museum to find the will of the imaginary historian that worked for years in the museum*
- *Students are challenged to collect related information from a variety of exhibits through reading exhibits' information and storing the clues in a notepad*
- The children try to locate the clues which can lead them to the will
  - *Each team has a PDA equipped with RFID tag readers*
  - Motivated to read information
  - Collect and exchange data
  - Manage information with criteria emerging from the clues
- *Towards accomplishment of their goal, the students have to collaborate and exchange data as the teams send clues to each other*
- *Finally, they have to engage into a problem solving process to construct meaning from the correlation of their findings*

Application used

(a)



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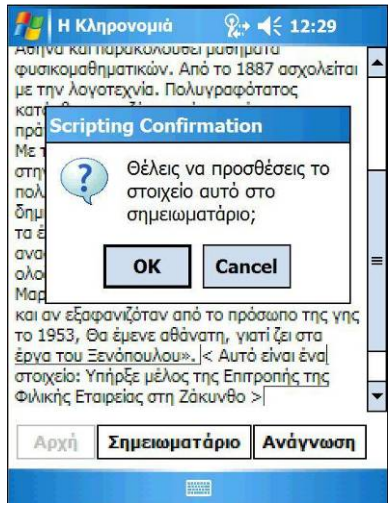

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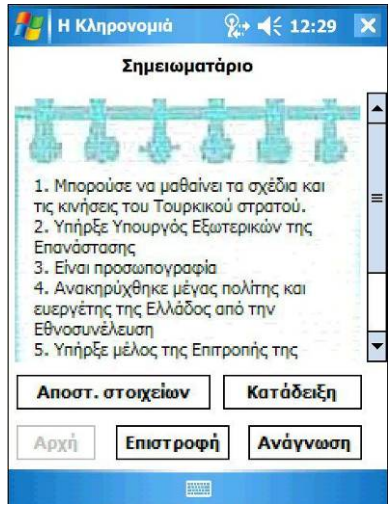


(d)

Offers a series of functions:

a) Scan and read RFID Tags

b) Retrieve and display information from the server

c) Store and exchange data (by pointing to each other's pda)

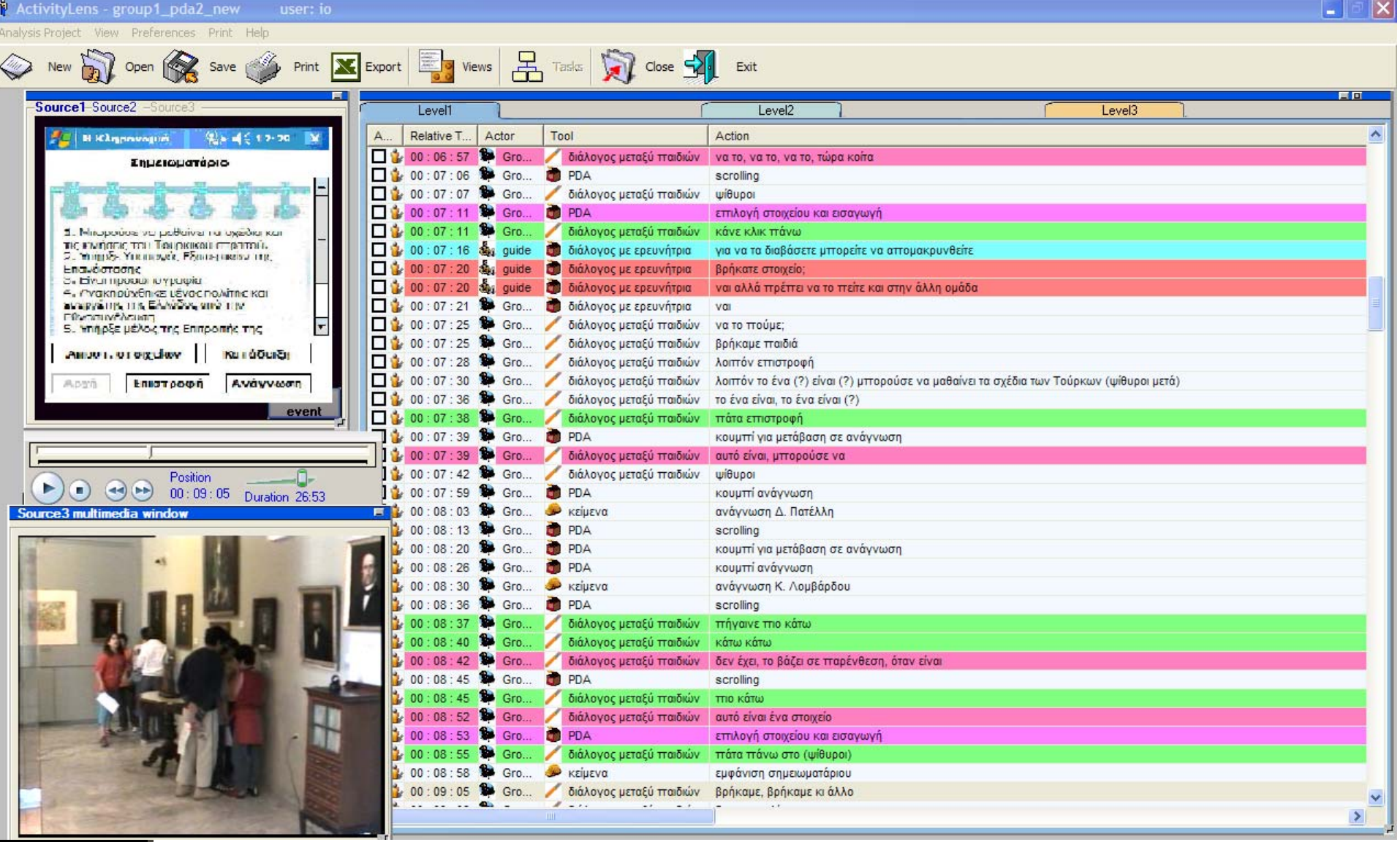
d) Examine collected clues and select the 'favorite' exhibit

Research methodology

- *Participants*

17 children (6 male, 11 female), aged 10, in 4 groups of 4 or 5 members each

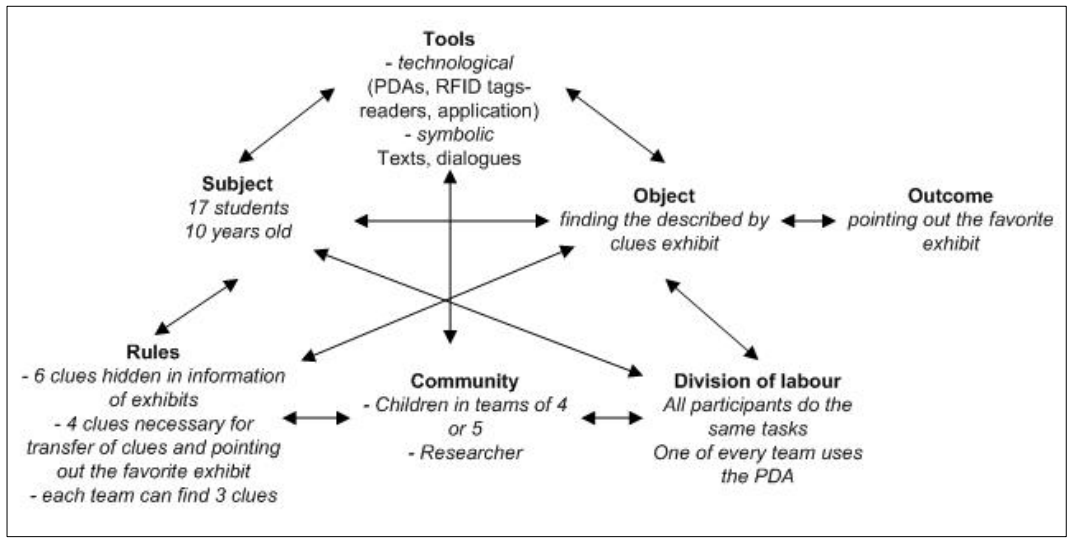
- Data collection via
  - mp3 voice recorders,
  - Video camera,
  - PDA screen capturing application
- Data handling via
- Activity Lens (updated version of ColAT)
  - Multilevel description and interpretation of collaborative activities
  - Ability to organize and synchronize data of different sources
  - "Typologies" (categories), "Actors" and "Tools" defined by researcher



http://hci.ece.upatras.gr/ActivityLens

Analytic Tool (1)

- Activity theory : knowledge is constructed in a social context through social interaction and use of cultural symbols
- A conceptual tool used to study human practices
- We chose to adopt this model of analysis, since such a learning activity is comprised by multiple interacting elements and learners collaborating with each other
- It takes into account both individual and collaborative events and the role of artifacts in everyday life



Analytic Tool (2)

- Transcription of dialogues, user events in the application, events derived from observations of the videos
- Implementation of the Activity Theory

Operations (conditions) → Actions (goal-driven) → Activity (motives)

- Definition of typologies (categories) for **Operations**

  "Reading of RFID tag", "Reading of exhibit's information", "Selection a function", "Finding a clue", "Reading of clues", "Sending of clues", "Dialogue for choosing exhibit to read", "Dialogue for finding clues", "Dialogue for sending clues", "Comparison of clues to information", "Dialogue for finding the favorite exhibit", "Dialogue requesting selection of function", "Request technical support", "Provide technical support", "Request task support", "Provide task support", "Promote Collaboration", "Monitoring progress"

- Identification of **Actions**

  Combination of the events and dialogues led to identification of three different goals that form three different goal-driven actions

  - "Data Search"
  - "Reasoning"
  - "Support"

Example of the action "data search"

Action	Operations	Dialogue & Events	Tool	Actor
Data Search	Reading of RFID tag	"Read" function	PDA	Group2
	Reading of exhibit's information	Reading of "K. Lomvardos"	Texts	Group2
	Reading of exhibit's information	scrolling	PDA	Group2
	Dialogue requesting selection of function	Go down	Dialogue	Group2
	Dialogue for finding clues	It doesn't have any clues	Dialogue	Group2
	Reading of exhibit's information	scrolling	PDA	Group2
	Dialogue requesting selection of function	Go further down	Dialogue	Group2

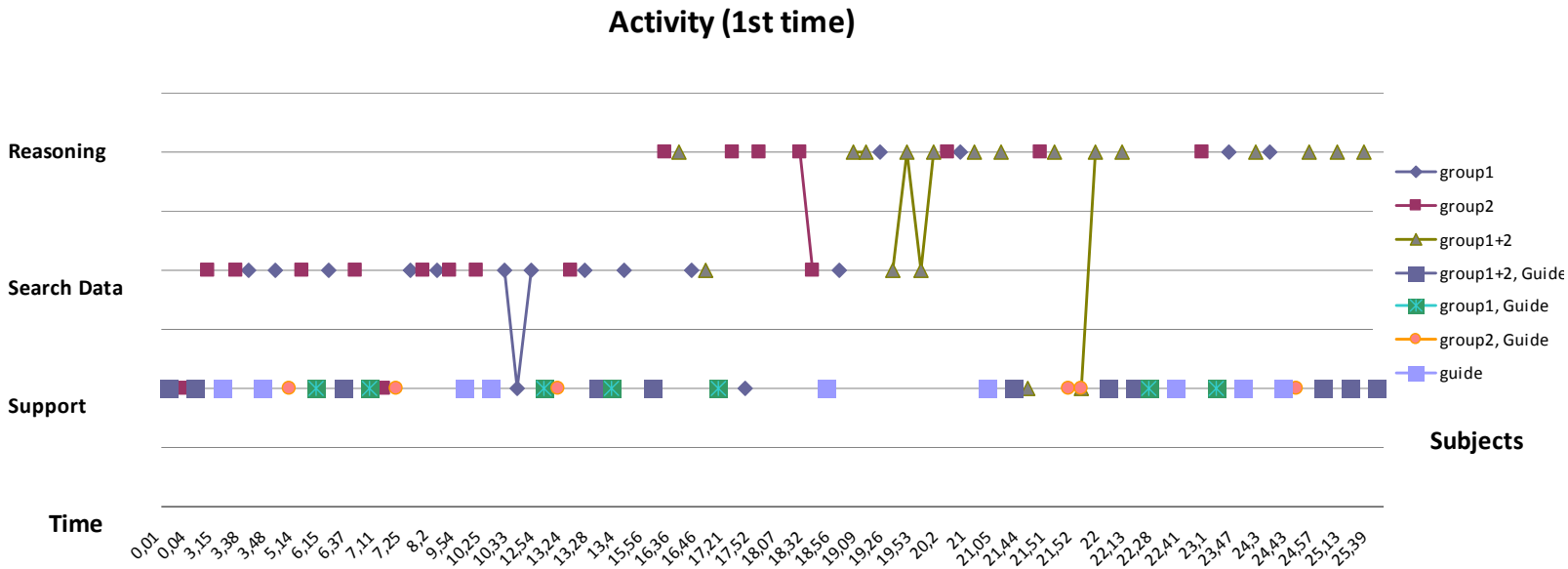
Example of the action "reasoning"

Action	Operations	Dialogue & Events	Tool	Actor
Reasoning	Reading of RFID tag	"Read" function	PDA	Group2
	Reading of exhibit's information	Reading of "D. Romas"	Texts	Group2
	Comparison of clues to information	Minister	Dialogue	Group2
	Dialogue for finding the favorite exhibit	Here it is! We found it!	Dialogue	Group2
	Dialogue for finding the favorite exhibit	Was he a Minister of Foreign Affaires?	Dialogue	Group2
	Dialogue for finding the favorite exhibit	We found it! The Minister of Foreign Affaires	Dialogue	Group2

Example of the action "support"

Action	Operations	Dialogue & Events	Tool	Actor
Support	Request technical support	If there are no clues, what do we press? We press "Read"?	Dialogue	group2 (2)
	Provide technical support	"Read" and you go to an other exhibit	Dialogue	Guide
	Monitoring progress	Have you exchanged your clues?	Dialogue	Guide
		Yes, we have found them	Dialogue	group 1+2 (2)
	Monitoring progress	Have you exchanged them? Have you sent them to each other?	Dialogue	Guide
		No, we have read them to each other	Dialogue	group 1+2 (2)
	Promote Collaboration	Wouldn't you like to send them?	Dialogue	Guide

Description of activity



- Support was needed and provided throughout the activity
- A pattern was identified in the participants' actions
  - In the first part of the procedure participants focused on collecting data
  - In the second part participants focused on reasoning and asked for support at every stage of the procedure

Discussion

- Data collection aimed in the detailed monitoring of the procedure
  - The combination of different sources of data can facilitate further study and deeper understanding of the tools' usage and the students' interaction with mobile technologies
- Activity theory as a conceptual tool to facilitate design and evaluation seems ideal in this context
  - focus not only on the outcome of the collaboration but also on the context and on the tools involved
- Appropriate support with technology could substantially enhance the learning opportunities
  - *This experience, which is in the border between learning and an entertaining activity, seems ideal to be supported by PDAs*
  - *Promotes imagination, engagement*

Open questions

- Adjustments in the data collection process

  improvements are needed in dialogue recording

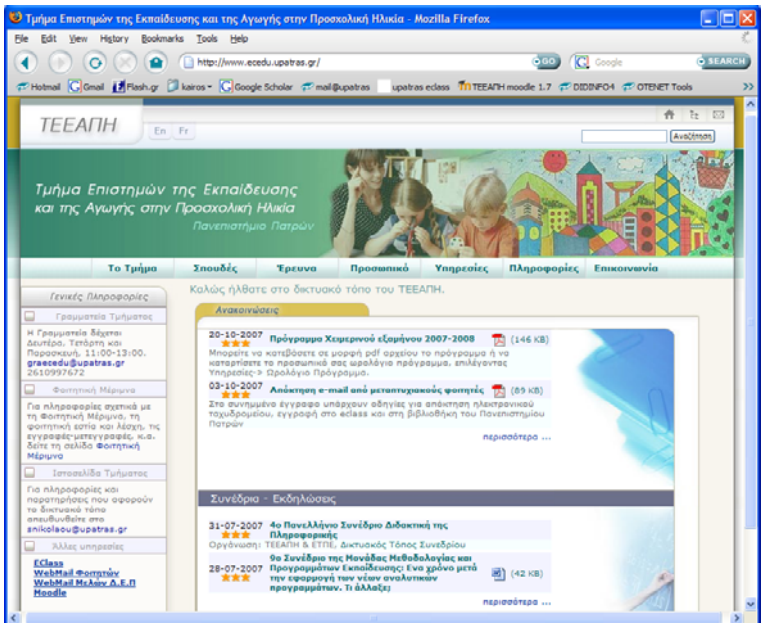
- Adjustments in the analysis tool for a more in depth analysis of dialogues

  new typologies have to be set for studying interaction and collaboration in detail

- Implementation of the analysis tool in different contexts

  an activity is affected by issues such as the scope of the museum and the type of the exhibits

Thank you for your attention!



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