

Learning History in the Constructive Hypermedia Environment of KASTALIA

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Abstract:

In this paper we present the research results of learning history using KASTALIA compared by the traditional teaching method using the school textbook in electronic format. KASTALIA is an educational hypermedia environment for learning archaic history and art. The special characteristics of the environment are the organization of the complex historical information, the context in which the historical sources are connected to. The overall organization of historical information in a hypertext system offers the students an alternative student-centered environment to explore, elaborate and exploit historical sources in constructing historical knowledge. Students learn through learning activities that guide them step by step and according to the level of difficulty. The flexibility of the hypertext environment motivates students to learn history more efficiently in a different from the traditional learning environment.

Introduction

Research held in Europe has shown that high-school students often encounter difficulties in the process of historical understanding particularly the key-concepts of time, evidence, change, continuity, causation, consequence in history and the understanding of events and issues from the perspective of people in the past (Carretero et al. 1997 Cavoura, 1994 Perfetti et al. 1993 Seixas 1994). The traditional means of teaching history is to rely heavily, if not exclusively, on the textbook as a means of conveying information. Students, early in their youth, make approaches to history reading school books or making visits to museums and archaeological sites (Pluckrose 1991). Students encounter problems in associating the historical knowledge acquired in school with archaeological findings and museum exhibits or ruins and in appreciating the value of originals or replicas historical sources in the writing of history.

Currently, the single text approach to history learning and the model of learning (upon which) it is based are being challenged by both constructivist views of knowledge acquisition and more traditional views of history (Stahl et al., 1995). The study of history has received renewed attention by cognitive psychologists (Wineburg 1994). This renewed attention may presage an interest in new methods of presenting historical content. While content knowledge is important, it is not sufficient for the study of history (Stahl et al. 1995). In addition, a person needs "disciplinary knowledge" or the ability to think in conformity with the historical practice, to evaluate materials and information in relation to their context and source, and to integrate this information into historical discourse (Greene 1994). The use of multiple resources can also increase students' disciplinary knowledge.

In the digital genre of history, students have the same access as historians (Lee & Hicks 1997). Teachers will no longer be able to present history *prima facie*. Instead, using multiple digital historical resources students will negotiate the stories of the past through their own inquiry and investigation. Despite the obvious similarities, digital historical resources are different from non-digital materials in at least four ways; (1) digital historical sources are more accessible, (2) they are easier to manipulate, (3) they are searchable, and (4) they are more dynamically organized.

The unique characteristics of the Web-like structure, particularly its hypertextuality, also encourage alternative narrative forms (Eklund & Woo 1998). As students write historical narratives in hypertext they have the ability, through the construction of links, to exercise a greater sense of control over the narrative and the structure of arguments within the narrative. The use of multiple perspectives is called "criss-crossing the landscape" and suggests that seeing an event or concept through different perspectives is necessary to create a rich understanding of it (Spiro et al. 1994 Balcytiene 1999). This use of original material forces students to construct links across information presented in different texts. This information and the links connecting the different sources are remembered better if students make their own constructions rather than rely on the constructions of a textbook author or teacher (Spoehr & Spoehr 1994). The links based on this "criss-crossing" create a rich mental model. Students can construct more meanings in environments that focus on activities in which students are engaged (Jonassen 2002).

This paper examines an alternative approach to learning about historical events, using multiple original source materials, and the processes used by students as they negotiate this new approach. The next section outlines the KASTALIA environment. Then, research results concerning learning history using KASTALIA compared by the traditional teaching method using the school textbook in electronic format are presented. The paper concludes and gives future plans.

KASTALIA

The Learning Environment of KASTALIA

KASTALIA is an educational environment for constructive learning of historical knowledge and art by the use of historical sources. The environment provides highly organized and linked in Web-like structure historical information, learning activities that guide the student step by step and according to the level of difficulty and a variety of tools for the elaboration of historical sources and the study of chosen topics (Cavoura et al. 2000 Grigoriadou et al. 2000). KASTALIA is structured according to the model: Theme –Scenario-Activity framework.

- The *theme* constitutes a historical thesis which is suggested for discussion. Each theme includes scenarios.
- The *scenario* constitutes an organized historical context in which the historical theme is placed and enlightened from different perspectives. Each scenario includes activities.
- The *activity framework* defines the characteristics of the historical context in which the historical sources are connected. The historical sources are accompanied by comments, key-words that refer to a data-base and vocabulary items that refer to the glossary. Each activity framework includes electronic activity sheet with jobs. The jobs are a set of questions and instructions that guide the students work and complete the activity sheet.

KASTALIA includes historical sources:

- Fragments of primary and subsequent historical sources supported by vocabulary items
- Representations of ancient finds: pottery, coins, inscriptions, sculptures, building fragments
- Historical maps

Moreover, KASTALIA offers study tools (note-pad, sketch-pad, glossary, virtual museum, data-base and a search tool facilitate the investigation of information, elaboration and recording of results) and communication tools (e-mail and chat-tool) to facilitate communication between students.

The teacher selects the theme, scenario and activity framework according to the teaching goals. The student concentrates on the activity framework, follows the instructions to study and elaborate the historical information using the tools and completes the activity sheet. During the lesson the teachers gives advices to the students if they ask for and re-orientates students in case they incline from the educational target.

Characteristics of KASTALIA

The special characteristics of KASTALIA are connected with the highly organized complex historical information and the context in which the historical sources are placed. The main educational goal is the students develop knowledge skills in order to construct historical knowledge in an environment that promotes the following characteristics:

- *Multiple conceptual knowledge representations.* Learning and knowledge acquisition are better achieved when students develop multiple representations of the domain under consideration (Punyashloke et al. 1995). KASTALIA environment provides students with multiple representations and different perspectives of the same information. For example, the activity framework: "*Expansion of communications*" is appropriate for transfer of text-information to map-information. Students are expected to represent on a map in the form of graphics knowledge organized by a criterion. The job "*Commercial communications*" invites the student to find in the data-base the key-word: *communications* and search for ancient findings concerning commercial between Corinth and other regions. Based on

the identity of the findings the job asks a) to mark on the map using different symbols the origin and the place where they were found by the archeologists, b) to connect the origin and destination points depicting the direction of the commercial communication and c) to use connecting velocities between the phenomena of the diagram to represent the relationship between cause and effect. The students can use information that results from different sources and create multiple representations depicting them on the map or a diagram. Students who have used the environment are expected to realize that relying on a single viewpoint is incomplete and merely leads to partial understanding of the historical events.

- *Complexity of organization of historical information.* The introduction of complexity at the initial stages of the educational process guards the students from being exposed to the simplicities that deform the historical knowledge (Punyashloke et al. 1995). Students are exposed from the beginning to complex historical information organized in contexts according to particular educational goals. Students are expected to observe, investigate, compare and interpret the information of historical sources in the activity framework guided by appropriate instructions and exploit them for the construction of more historical knowledge. For example, the job “*Commercial development*” (of the activity framework: “*Expansion of communications*” mentioned above) invites the student to observe the historical sources and search for information according to a criterion. Then the job asks students to categorize the information found and formulate a title for each category. The second job invites the students to separate cause and effect in phenomena and construct causal relationships. Then the job asks students to distinguish between the historian’s position and his argumentation in the historical narration.

- *Context dependency.* The learning of a concept is achieved not in a way like reading a dictionary but rather by seeing it used in a variety of real place-time historical contexts where it acquires its meaning. The hypertext structure of KASTALIA supports studying in a context-dependent environment. For example, the job “*Commercial development*” invites students to construct of their own the abstract concept of *Navigation* in ancient Greece, using information explored in historical sources rather defining it. So, the student is enabled to explore instantiations of concepts across different contexts.

- *Knowledge interconnectedness.* In an environment like KASTALIA, the student realizes the ability of appropriate texts, images, graphics, maps etc. and their components to refer to each other in complex ways supporting, ignoring or denying the meanings of other texts according to the context. The student develops a sense that there are many ways to achieve understanding and not only following a single path. Classifications of objects and situations change in different circumstances, so the student has to reclassify the knowledge elements.

The Research

During the research, two different forms of teaching are applied in order to prove the learning outcomes of application of KASTALIA: (1) teaching history using KASTALIA and (2) traditional teaching method using the school textbook in electronic format (Mastrapas 2002). In this paper, the learning outcomes of learning history using KASTALIA compared by the traditional teaching method using the school textbook in electronic format are described.

The first goal of the research is to examine the students’ learning difficulties in comprehending history. The research focuses on the registration of students’ reactions exposed in a new teaching situation defined by the computer, totally different from the already known traditional teaching environment.

The second goal of the research is to explore the effectiveness of KASTALIA environment for teaching and learning history. Moreover to explore how the particular characteristics of the hypertext and highly linked environment help students overcome their learning difficulties and form their knowledge. Special targets of the research are the investigation of: (1) Students’ conceptions for the use of historical sources in learning history. (2) Students’ learning difficulties in extracting information carried by the historical sources and their correlation with historical knowledge. (3) How the organization structure and the interconnection of historical information affect the students’ historical thought and (4) Which are the changes in their representations about history concerning the selected topic after the use of KASTALIA.

The participants are 20 high-school students of tenth-grade (from Franco-Hellenic Lyceum «Saint-Paul») divided in two groups: the control group (A) and the target group (B). Each group consists of students belonging to different learning level in history but with the same ability to use an electronic book. The research is held in the school laboratory of Informatics. The topics of the archaic history, which are used in the research, are included in the school text book and students have studied them in class before five months.

The selected topics concerned the Colonization during the archaic history and especially the development of financial activities in a Greek ancient city-state: the polis of Corinth. The material we use includes:

- The *Prior knowledge writing task*.

- The *Electronic book*. The *electronic book* consists of digitized historical material (texts, maps, historical sources) included in the school textbook, see Fig. 1.
- The environment of KASTALIA, see Fig. 2.
- The *Activity worksheet*. The students are assigned a worksheet, different for each group, concerning the selected topic, see Figures 1 and 2.
- The *Evaluation sheet*.



Figure 1: (a) A fragment of the *electronic book*.

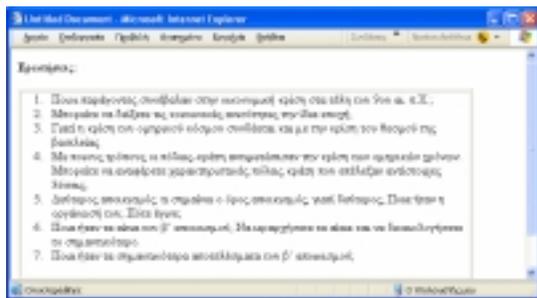


Figure 1: (b) The *activity worksheet*.

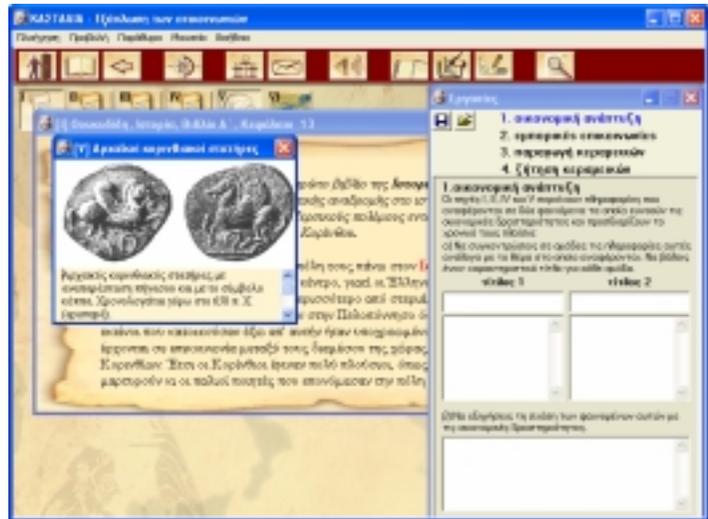


Figure 2: Environment of KASTALIA and part of the embedded *activity worksheet*.

The study is held in three stages: In the first stage students of both groups are given the *Prior knowledge writing task*. To test their prior knowledge concerning a not recently taught topic students are assigned the question: “Please write down your opinion about the causes and effects of Colonization worked out by the city of Corinth”. In the second stage students of both groups studied the topic using the computer but different environment. Students of control group A worked with the *electronic book* and completed the *activity worksheet*. At the same time students of group B engaged in KASTALIA, explored the environment and completed the embedded *activity worksheet*. In the third stage students of both groups completed the same *Evaluation sheet*. The evaluation sheet included questions and justifications concerning the Colonization phenomenon. Moreover, it included questions about students’ attitudes concerning the importance of historical sources in learning history and the role they can play in the construction of the teaching model.

Research Results

1st and 3rd Stage

The answers in the third stage are expected to be influenced by the traditional teaching method. In fact, there was difference between the answers of 1st and 3rd stage concerning the common question for group B, which used KASTALIA, but not for group A, which used the electronic book. Comparison between the answers for group B resulted in the conclusion that after studying with KASTALIA students modified their prior knowledge and are more able than before to construct complex and qualitative relationships between the Colonization phenomenon and other historical factors. For example, while in the 1st stage the mentioned factors that caused Colonization are: the trade, the industry, the geographical position, the political organization and the demographical crisis in the 3rd stage the moreover mentioned factors are the increase of production rate, the domination on land and sea commercial roads, the navigation, the political changes, the Corinthian coin cutting and exchanges.

2nd Stage

KASTALIA environment met students' acceptance with enthusiasm. Indicative answers to questions concerning the use of historical sources in a context are stated below.

- *Use of historical sources.* Concerning the students' attitudes towards learning history they seem to understand the dependency of historical knowledge from the historical sources. Fig. 4 depicts the identified answers to the question: "Do you think that historical sources are necessary to learn history? Justify your answer."

Identified answers	Comments concerning students' attitudes
<i>Historical sources are necessary to understand the historical events. We can't learn history without historical sources. We take proved and validated information for elaboration and conclusion extraction. Source comprehension leads to history comprehension Sources formulate history. Sources help us forming integrated view of history. Historical sources are only the texts. We study the historians based on their real texts.</i>	Positive attitudes, confused point of view, misconceptions about historical sources and their importance for the historical knowledge (Groups A & B)
<i>Historical sources function as motivation for discussion. Historical sources confirm the school textbook</i>	misconceptions about historical sources (Group A)
<i>Historical sources are a means to discover our ancestors' civilization We study historical sources in relation with excavations' elements</i>	historical sources conform with historical discipline (Group B)

Figure 4: Identified answers in 3rd stage concerning the use of historical sources. Group A (traditional teaching) and Group B (KASTALIA).

Students' attitudes are different concerning the use of historical sources in learning history. Students of group A (traditional teaching) consider the learning of history as totally dependent on the school text book. They seem to be in distance from the historical sources when they make references to them. They consider historical sources as a complementary means of learning or a motivation for discussion in the everyday history lesson or a means of confirmation of the textbook content, if they are used by the teacher. On the contrary, students of group B, after experiencing KASTALIA, consider historical sources as a necessary means for historical knowledge construction by the historians as well as for learning history. They seem to change their attitude towards the use of historical sources as they consider them a means to discover and complete our knowledge about history.

- *Contextualized historical sources.* Students seem to understand the value of the historical sources when they are placed and connected in a context of time and place. Moreover they appreciate the necessity of guided discovery for learning history using historical sources. Fig. 5 depicts the identified answers to the question: "Is it effective to learn history following this teaching method (using historical sources)? Justify your answer." Students of group A appear to have deficiencies in exploitation of historical sources, whereas students of group B seem to have the ability to develop their procedural knowledge.

Identified answers	Comments concerning students' abilities
<i>Historical sources included in the textbook sometimes seem to be not connected with the text. I prefer to read the text and just have a look at the sources. Historical sources are important for learning history but someone must lead me to search in them and do things.</i>	Deficiency to exploit historical sources in classroom context (Group A)
<i>Historical sources offer information from different points of view. I prefer to use historical sources to do activities and answer to questions than reading only the schoolbook. Using historical sources we study the historians' primary material. The use of the sources depends on what I'm asked to do.</i>	Ability to develop procedural knowledge (Group B)

Figure 5: Identified answers in 3rd stage concerning the contextualized historical sources.

Discussion

This research focused on processes concerning the exploitation of historical sources in school during teaching and learning history. Learners of the electronic book seem to ignore the information included in the historical sources. Their answers in general questions are based on their prior knowledge, on the memorized one, on their experiences or on commonsense. This fact can be explained by the lack of direct connection of historical sources with the historical context and the lack of organization of historical information according to concrete goals. Moreover, the lack of

guidance in using historical sources in a not organized teaching environment, results to less motivation. Learners of KASTALIA enjoyed its advantages. They used multiple representations of information gained from historical sources: texts, images or maps in order to understand that multiple views lead to a more complete comprehension of historical events. Being exposed from the beginning to the complex and organized in contexts historical information and focusing on concrete learning goals the students were protected from simplicities that deform historical knowledge. The flexibility of the hypertext environment motivated students to search for information and explore, compare, estimate and interpret it guided by appropriate activities.

Conclusions and Future Plans

Students' attitudes towards learning history are not directly observed rather they are indirectly estimated after analyzing their reactions under fixed circumstances. Our research focuses on the estimation of students' attitudes in order to achieve its main pursuit: to help students alter their attitudes to others more functioning and more compatible to historical thought. On the other hand, traditional teaching seems to have made students look for the "security feeling" a textbook promises. The idea of experimenting with the unknown for the discovery of historical information or knowledge construction although motivates them it makes thoughtful those who hesitate to deny the traditional teaching patterns. Our future plans include application of KASTALIA in real classroom conditions with the participation of a greater number of students and using multiple activities during a three months' course. We also plan to study more complex students' learning problems of history.

References

- Balcytiene A. (1999). Exploring individual processes of knowledge construction with hypertext, *Instructional science*, Vol. 27, pp. 303-328.
- Carretero, M., Asuncion, L.-M., & Jacott, L. (1997). Exploring historical events. *International Journal of Educational Research*, 27, 245-253.
- Cavoura Th., (1994). Modalités de l' appropriation de la connaissance historique. Représentations de la causalité, du possible et du nécessaire, du hasard, de la cause et de l' interaction chez les élèves de l' enseignement secondaire, Phd thesis, Paris VII.
- Cavoura Th., Tsaganou G., Koutra D., Telelis J., Grigoriadou M., Samarakou M., Solomonidou C., Papadopoulou K. (2000). «Design methodology of history and art educational software supported by a data base of historical sources and instructional scenarios». Proceedings of 2nd Hellenic Conference: The technologies of Information and Communication in Education, Patras.
- Eklund J., Woo R., (1998). A Cognitive Perspective for Designing Multimedia Learning Environments. ASCILITE '98.
- Greene, S. (1994). The problems of learning to think like a historian: Writing history in the culture of the classroom. *Educational Psychologist*, 29, 89-96.
- Grigoriadou M., Cavoura Th., Tsaganou G., Koutra D., Samarakou M., Solomonidou C., Papadopoulou K., (2000). Interactive Multimedia Teaching Environment for History and Art Explorative Study by the use of Historical Sources, Ercim wg ui4all & i3 Spring Days 2000 Joint Workshop on *Interactive Learning Environments for children*, Athens, Greece.
- Jacobson M. J, Maouri C., Mishara P., Kolar C., (1996). Learning with Hypertext Learning Environments: Theory, Design and Research. *Journal of Educational Multimedia and Hypermedia*, 5(3/4), 239-281.
- Jonassen D. (2002). Learning as Activity. *Educational Technology*, 3.
- Lee J. K., Hicks D., (1997). Use of digital historical resources in a single school system. Georgia State University, Technical report.
- Mastrapas A. (2002). *History of Ancient Greece, High school text book*, OPSB.
- Perfetti, C. A., Britt, M. A., Rouet, J.F., Mason, R. A., & Georgi, M. C. (1993). *How students use texts to learn and reason about historical uncertainty*. Paper presented at the annual meeting of the American Educational Research Association, Atlanta, GA.
- Pluckrose H. (1991). *Children Learning History*, Basil Blackwell Ltd, UK.
- Punyashloke, M. Spiro R., Feltovich P., (1995). Technology, Representation and Cognition: The Prefiguring of Knowledge in Cognitive Flexibility Hypertexts, In H. van Oostendorp, S. De Mul (eds). *Cognitive aspects of electronic text processing*, Ablex Publishing, Norwood NJ.
- Seixas, P. (1994). Student's understanding of historical significance. *Theory and Research in Social Education*, 2(3), 281-304.
- Spiro, R. J., Coulson, R. L., Feltovich, P. J., & Anderson, D. K. (1994). Cognitive flexibility theory: Advanced knowledge acquisition in ill-structured domains. In R. B. Ruddell, M. R. Ruddell, & H. Singer (Eds.), *Theoretical models and processes of reading* (4th ed., pp. 602-615). Newark, DE: International Reading Association.
- Spoehr, K. T., & Spoehr, L. W. (1994). Learning to think historically. *Educational Psychologist*, 29, 71-77.
- Stahl, S. A., Hynd, C. R., Glynn, S., & Carr, M. (1995). Beyond reading to learn: Developing content and disciplinary knowledge through texts. In L. Baker, P. Afflerbach, & D. Reinking (Eds.), *Developing engaged readers in school and home communities* (pp. 139-163). Mahwah, NJ: Erlbaum.
- Wineburg, S. S. (1994). Introduction: Out of our past and into our future-the psychological study of learning and teaching history. *Educational Psychologist*, 29, 57-60.