Collaborative Learning Using Google Facilities

An elementary school's case study

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Abstract—In this paper a case study of computer-supported cooperative and collaborative learning, between two Greek elementary schools is presented. The schools are located in different regions, far away from each other. To learn and exchange information about the regions they operate and about the life and culture of their inhabitants students used Google Earth, Google maps, Panoramio and Skype. Teachers' experiences and students' reactions participating in this project are presented. Emphasis is given to the methodology teachers used in the learning process. Authentic learning conditions can be created, during which simple and free applications that are available on Internet, can be transformed into effective cognitive tools. It is hoped that this project can be a paradigm for similar actions by teachers, exploiting free available software together with a properly structured and effective educational scenario to enrich their teaching.

Keywords—computer-supported collaborative learning; collaborative learnign; Panoramio; Google maps; Google capabilities;

I. INTRODUCTION

The use of collaborative process for teaching has occupied the pedagogical thinking from the very beginning of the previous century. Vygotsky's theory of social constructivism, the recognition of the role of social context in the cognitive individual development by Piaget and the social character of knowledge building as expressed by Brunner, placed special emphasis on the design and development of strategies and teaching methods promoting collaboration and social interaction between group of students [1] As a method of learning process, collaborative learning was applied from the beginning of the last century in the context of cognitive apprenticeship where the most experienced specialist taught the younger students the practice and the secrets of his job.

Technological development and especially the integration of Internet use and social networking in education, contribute essentially in the implementation of collaborative learning offering to students the opportunity to work in teams simultaneously, on the same cognitive environment, both in the same classroom and between cooperating schools, irrespectively of location. The application of Computer Supported Collaborative Learning (CSCL) models in classroom requires to reshape existing traditional structures and the roles of protagonists. Both teachers and students participated in this process shared different roles and responsibilities [2], [3]. A number of studies are focused on the benefits for learners that are involved in processes of collaborative construction of knowledge [4], [5]. In the same time there are many researchers that express doubts about the effectiveness of learning can be achieved using collaborative methods, especially between both preschoolers and pupils attending first years of primary school [6], [7]. These studies are referring to the low level of collaboration quality which each student group is able to achieve through collaborative learning and also to the undoubted unequal participation between group members they are involved in collaborative process. Other studies are referred to factors that prevent the effectiveness of CSCL. Among them is the existence of loafers between student groups, student attitudes to CSCL and the ease of use of software interface [8], [9], [10]. Considering the above the following research questions were formulated:

Can we utilize effectively CSCL in primary education?

What is the gain of CSCL application in primary education and which are the factors they inhibit it?

Is the interface of the educational software or the collaborative method applied by the teacher the essential factor for effective learning?

In this work we will try to give some answers on the questions above, presenting the results of collaboration learning between two elementary schools, one in northern Greece and the other in the south-eastern island country. Students using Panoramio, Google maps and Google Earth as well as the convenience of direct communication via Skype, implemented a computer supported collaborative and cooperative learning project. Students' degree of responsiveness to the implemented activities, the impressions of their participation and the impressions of teachers who have been involved in this training, was studied.

In this work the term "collaborative learning" will be used referring to learning process between students of the same

school working together to achieve a common task and "cooperative learning" will be used to describe common activities and communication between students of both schools.

II. OTHER RESEARCH ON CSCL

There is a number of research works referred to the effectiveness of collaborative learning and its advantages in the learning process. According to Dillenbourg [11, 12] and King [13] the use of educational scenario is a very effective method to promote CSCL. Following this approach, teachers are able to describe ways of structuring interaction and scaffolding collaborative learning through the use of roles, actions, and sequencing of activities. Research in different contexts Hooper & Hannafin [14] and Webb, Nemer, Chizhik & Surgue [15] report that collaborative learning tends to advantage more below-average students while the high ability students continue to show high performance as members of heterogeneous groups. Recognizing the central role of social context in the improvement of written word, language teachers implemented CSCL using synchronous and asynchronous written communication (chat, wikis) [16], [17]. The results of their efforts were very encouraging related to the level of collaboration between the students and with respect to manner in which they exploited the dynamics of writing. A series of surveys presented positive results in students' collaborative use of virtual worlds in problem solving [18]. To promote environmental education among secondary education students in Catalonia, teachers made use of the benefits of a web-based collaborative environment. Students' final product was a map that was collaboratively constructed, as a result of the relationships between images, words and places. The pilot project has been a successfully pedagogical experience [19].

However, most researchers have focused their interest on the results of CSCL between university students or secondary education students. There are only a few studies investigating the application effects of CSCL in primary school children.

In a comparative survey on elementary school students in the Netherlands, Meijden and Veenman [20] examined the effects of cooperative learning on problem solving in mathematics, among students with face to face collaboration and computer supported collaboration using chat. Presented findings showed that student performance in face to face collaboration was qualitatively superior to the cooperation of students supported by the computer. A case study in elementary school in Canada [21] refers to collaborative learning with ICT support by utilizing the capabilities of a Wiki. Students given a scenario constructed collaboratively their own stories using the Wiki. Students collaborating in small groups performed better than those who participated in larger ones. A case study in primary school in Turkey [22] found substantial improvement in student achievement in geography through participation in the collaborative learning environment of a game using virtual reality.

III. METHOD

In this case study 41 pupils from both schools participated. One of the schools is located in northern Greece (21 students) and the other in the south-eastern island country (20 students).

All of the students, between 11 an 12 years old, were studying in the last two grades of primary school.

Qualitative research method was selected for this work, using a combination of focus groups and semistructured interviews. The participants were divided in four focus groups, two groups per school to facilitate the research process. The Related teachers were interviewed, both to ensure reliability of the study and to obtain important data with respect to the evaluation of the process.

The axes on which the survey was designed are focused on:

- Change of the students' behavior on joining in a new CSCL environment

- Mode and quality of collaboration that has developed between students during learning

- Ease of use of the interface of the educational environments

- Teaching methods and educational scenarios developed by teachers

- Students' satisfaction during their participation in this process

The researchers undertook to respect the anonymity of all research participants.

"A" was used as a code name for the school located in northern country and "B" for the island country.

Correspondingly, focus groups of school "A" were named "A1" and "A2" and of school "B", "B1" and "B2".

IV. THE PROCEDURE

A. Creating a problem solving inquiry

Students of two primary schools were guided to contact each other via Skype. After acquaintance, they decided to cooperate and to implement a project. Realising that tourism is a source of income for their regions identified the need to present the history of their region, attraction points of the cities and life and culture of their residents. Trying to find the way which they can apply their plans, they agreed that internet is a powerful tool to promote their work, having a variety of applications available for use. After a new brainstorm, through the discretionary guidance of their teachers, they decided to develop a digital map which will contains all the elements they decided above.

B. Selecting software

For the implementation of this project the following internet applications were picked up:

Google Maps: The application enables users to imprint photos, texts and links in the world map. Also, exporting a special file (KML), the application allows the users to transfer the above information to Google Earth Application. This view is available only to the holders of this KML file.

Panoramio: Users of this application are able to upload a number of photos in Panoramio. They are able also to imprint each photo on the world map creating in this way their own

photo gallery. During implementation of the project, Panoramio was used as storage of photos. Students copied the URL of the photos which they uploaded in Panoramio in order to display them with useful information in Google Maps.

Google Earth: Google Earth used as the projection medium of the throughout the activity.

The choice of the above applications was made on the following grounds:

- The interface of these applications can be changed into local language for easy use.

- They are inherently easy and zero cost applications.

- Students were already familiar with the elementary characteristics of Google Earth and Google Maps from other subjects (geography, natural sciences etc.)

- The use of the above applications requires the implementation of a number of activities by students and familiarization with a variety of skills that stimulates their interest and maximizes their participation throughout the duration of the activity.

The two schools had a joint account in Panoramio and Google Maps. Students gradually developed the digital map of their own area, looking at each other's work and progress.

C. Collaborative learning and the roles that developed

Students of each school shared different roles. Some took on the role of the historical researcher, some of the tour operator and others they took the role of folklorist. They were divided in heterogeneous groups of 4-5 members. Each team was required to have its own "scientists" to examine each point of interest imprinted on the digital map studying it from all possible aspects. In this way, every student had a special responsibility within his group. After they selected the points of their region, they shared their views with different groups before they imprinted them on the digital map.

Students of each school collected information using Internet and a variety of multimedia, visiting the library of the school, making short interviews about each landmark they had to examine. Collaborating in groups, students processed the collected elements and decided which ones to visit. Before the actual visit, each group prepared an article showing the value of each landmark, its history and the reasons why one should consider it. During the visit, they took pictures with a digital camera, while each team presented to others the information collected. Students categorized their photos, and through Panoramio uploaded them to the web. Two computers from informatics laboratory were available for use by each group. Using Google Maps, each group displayed the landmarks had chosen to present and transferred the gathered information relating the photos in Panoramio with information on the map.

Once the above process was completed by all groups, students save the digital map they built and exporting to computer the KML file that enables them to view in Google Earth application the final product of their work. Students from both schools worked simultaneously so that one school could monitor the progress of the other. Through Skype, students shared their impressions, exchanged questions, talked about their cities, their habits and the experiences gained from the activity. The digital map (KML file and passwords on Panoramio and Google Maps applications) was stored by both schools, so that next year the system could be enriched with information from other students and other schools they could collaborate. At the end of the school year students of each school presented their work to other classes of their school.

D. Roles and strategies

Teachers' role, during this activity was far from traditional. They were not lectures or the sources of knowledge. They took a place next to the students as guides, animators and managers of the learning conditions. In the beginning of the process, using problem solving strategies they won the attention and the interest of the students. Through their discretionary guidance, during the discussion between students, they created authentic situations of learning making the students to consider the implementation of the project connected directly with their individual aspects.

Students as researchers were in the centre of the learning process. Utilizing all the available sources, collaborated in groups to achieve common aims they set working in an environment of gradually increasing autonomy.

During the phase of data analysis, teacher of the school "A" used a structured task sheet which described content and structure of the text that students will need to create for each landmark to put on the digital map. It described also in detail the process of uploading photos to Panoramio as well the steps to imprint each landmark on the digital map. Teacher of the school "B", desiring to make the entire process more pleasant for his students, presented all the points using a projector and then let them free to cooperate per group under his discretionary supervision.

V. DATA ANALYSIS

The final product of this CSCL project between two schools was a common digital map containing photos and useful information about the landmarks of the two schools regions. Each students' text is a synthesis from particular information is written by the "the scientists" of each group. The focus of this work is on the effectiveness of the process and on the students' and teachers' experiences as they participated in this project.

A. The final product

Texts of the students of school "B" had different structures and several problems more than school "A" who its students followed a structured task sheet during the process. Also, photos collected by students of the school "B" were centred more to student's interests and less to the aims of the project. In question *"What is imprinted in this point"* the students' answer of focus group "B2" was: *"Is the place we playing very often. Also, on the left side of this park, in the corner of the photo is the sub-prefecture of the island".*

B. Collaboration quality

The teachers' views converged that even though the students had worked already in groups on previous occasions, their implication in this project maximized their collaboration

in frequency, in quality of dialogs and exchanged information. As they found, students' involvement in the activity changed the "chemistry" of students between them. This activity gave them the opportunity to use technology in a very practical manner in their everyday lives, to feel useful and effective and to understand the potential of cooperation with other students and classmates. Teachers consider also that the distribution of roles between the group members both increased the degree of the shared responsibility of each member to the group and maximized the collaboration between groups' members who had taken same roles. The teacher from school "A" referring to this issue said: *"...the collaboration learning process was structured so flexible that the students had not the chance based it in text copy-paste procedures...instead, their collaboration was focused on the exchange of research sources, experiences and suggestions on the methodology that should be followed...No place for loafers in this process. Everybody should work. If they did not, their team pushed to do so".* Teacher of school "B" emphasized the collaboration which developed among students within the same group: *"..High performance students took the role of teacher to the weakest students helped them and they actively collaborated together in the process...".* Expressing the same view, teacher of the first school said additionally: *"One of the most pleasant surprises of this collaboration was the performance of students below average. They did not seek to hide behind the group. They asked to learn anything they did not know; they collaborated with others even though they required more time to computer compared to others to complete their task".*

The teachers' views converged with those of the students of both schools. A female student of the focus group "B2" said characteristically: *"Everybody in my group had the desire to present something from his place. We did it because we wanted to do it. Everybody had an own role. But also everybody we helped each other...it was something like puzzle. Each student had to put his own piece...".* A male student from focus group "A2" said: *"I had difficulties to find folklore information about the Vlachs living in the city. My classmate Anna from other group told her father that he had some knowledge on this topic to help me. So I took an interview from him"*

C. Students' satisfaction

Whole the students of the schools who participated in the project, during the focus groups discussion seem to be enthusiastic about the activity and the outcome of their work.

As the teacher of the school "B" said: *"It was something new for them. The implementation of the activity came after their own decision...they felt that it was something they needed to do it... all the process was successful maybe because the didactic transformation was successful and very close to the student's interests...".*

We highlight the words of a male student of the focus group "A1": *"..I never expected that we could do so many things with my classmates. I used to see my father's GPS in the car and admired people who made it. Now I can create by myself my own digital map.. One day maybe I will be able to made my own GPS".* During the discussion with focus groups "A1" and "A2", students offered to present their work to the rest of the students in their school. In this way they expressed

the hope that they will have next year more partners to continue this work focused on the same or other issues. Many students expressed their interest to resume the activity in cooperation with another, new school and on a new task.

D. Application and extension in practice

It is worth noting that during the discussion groups, students expressed proposals to apply the same process themselves personally constructing their own digital map imprinting the places they have visited, football teams who love from all over the world, the mountains and rivers of our country. A female student from focus group "B1" said characteristically: *"My cousin lives in Germany. Maybe, if I create my own map including beauties of my island to attract her to come next summer for holidays here."*

E. Barriers

However, according to the findings of teachers, there was a set of factors that prevented the smooth implementation of the process, which they should be addressed.

The uploading speed of the school computer lab in both schools did not help the fast uploading of a big number of photos which students acquired during the process. Teachers cope with this problem resizing all the collected photos. Regarding to school internet connection, teacher of school "A" referred: *"One day we planned to work in computer lab on our digital map. The internet speed was painfully slow. Students got tired. The next time we went to continue they had not the same enthusiasm. Their mood changed them when they realized that the speed of the internet was good".*

Students were not familiar with the imprinting process of the landmark points on Google maps even though they had some basic skills relevant on use of this application from previous subjects. This problem was more intense for the students of school "B", who did not have a task sheet available in them to assist their work apart from their teacher's initial presentation of the process. After the first efforts, student's familiarisation with Google maps was spectacular and the activity proceeded normally.

Teleconference between students of the participant schools via Skype sometimes was interrupted. Teachers observed some lack of familiarity among students during the presentation of the final work. They talked all together with enthusiasm creative noise and havoc. Gradually, they understood all the rules to be applied in a teleconference and the problem ceased to exist. Similar problems were observed in the initial phase of the collaborative process. Some students claimed more time than others to work on the computer. Group dynamics and the discreet intervention of the teachers contributed essentially towards the solution of this problem.

VI. CONCLUSION – DISCUSSION

Two elementary schools, one in northern Greece and one in the south-eastern island country cooperated implementing a collaborative learning project with ICT support. The students of each school were divided into groups of 4-5 members, each member took on different role. By taking advantage of the special characteristics of the applications Panoramio, Google maps and Google earth they created a digital map which

contained photos and useful information about the landmarks of the students' regions. Communicating via Skype, each school presented the results of its work while expressed students' experiences after their participation in the process.

According to the data obtained from this study, students performing below-average showed greater progress during the procedure compared with high performance students. These findings converge with the results of Hooper & Hannafin [14] and Webb, Nemer, Chizhik & Surgue [15] studies. The collaboration of the students, according to data obtained from particular individual interviews, was not based on copy-paste procedures between students' works but on the substantial support of the members of each group. This support started from simple encouragement of low performance students to successfully complete their obligations and reached to a broader methodological consultative strategy aimed to develop their work. According to views of students and teachers, assigning of different roles among the members of each group ensured equal participation of each member, thus avoiding the existence of loafers.

According to data obtained from this survey, a major parameter affecting the quality of the students' final work is the existence of a structured learning scenario, accompanied by a suitably designed task sheet. The findings of this study converge with those of Dillenbourg [11, 12] and King [13] who emphasize on the catalytic role which can play the existence of a structured scenario in the learning process. Such a scenario affects the degree of students' satisfaction and ensures the quality of the learning process.

However, according to Stern & Huber [23] there is no connection between the organization of the activity and the extent of success. A major factor involved between these two variables is the degree to which students have decided to participate in this process. The didactic transformation used by teachers of this study, created authentic conditions of learning [24] among students of both schools and contributed essentially to maximize the collaboration between students during the learning process. In particular, teachers through discussion, lead students to understand the process as their own need and as their own decision to promote through internet the beauties of their place. This factor ensured the complete acceptance of the project by the students and in conjunction with all the above factors, contributed effectively to the success of the project.

A set of barriers was found, during the process. The lack of speed in schools' internet connection can be overcome partly by minimizing the amount of data which students had to upload to Panoramio. However, the existence of low-speed Internet access for long time led to changing attitudes of students towards the whole process. Solving the problem reinstated the initial enthusiasm in students to complete their work. Focusing on the above incident highlighted the need to control all the factors on which depends a guided collaborative learning process. The existence of a single inhibitory factor can upset the normal development of the process.

The required time to familiarize students with the interface of the software does not seem to have been a deterrent to the process. This is probably due to ease of use of the selected software, to previous familiarization of students with similar environments but also to the positive attitude which students adopted toward the process.

It was found that with the appropriate use of software and educational environments, which are free on internet, combined with the successful management of the students by the teacher, can achieve an effective collaborative learning process that can change the traditional teachers' and students' role catalytically giving a new dynamic in contemporary education. The success of a CSCL is not always connected with the lavish interface of expensive software but is directly depended on the talent, inspiration and mood of charismatic teacher. A teacher with the certain strategy is the critical factor that both can enhance the use of moderate quality software or can degrade the value of an optimal learning environment. A teacher is also the factor that with the support of appropriate educational scenario will utilize group dynamics in the classroom and will change the student to modern explorer, thus creating authentic learning situations. ICT remain as just another modern supervisory tool of traditional teaching if not used by the students themselves as cognitive tool. ICT through the implementation of the appropriate educational scenario will utilize group dynamics of the classroom and putting the student to the centre of the learning process as contemporary researcher. Utilization of ICT within a collaborative learning process, can contribute to changing the chemistry among students in cultivating respect among them and social co-perception of a team which is a big need of the future society.

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