

ABRAZADOS PROJECT: A COLLABORATIVE LEARNING WITH CONCEPTUAL MAPS

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Abstract

A project developed jointly by students from Carlos Amarante Secondary School (Braga, Portugal) and students from Santa Maria del Pilar School (Marianistas) (Saragossa, Spain). The primary goal of this project was that students from two different countries shared information about certain topics (history, population, city council, urban area, monuments holidays, etc.) relating to their towns. The students made conceptual maps about these topics and so they have checked that they have some characteristics which are common and others which are different. The name aBRAZAdos means Braga and Zaragoza hugged each other.

The project has been developed on the Internet by students using IHMC CmapTools software, developed at the Institute for Human and Machine Cognition (IHMC). It enables users to construct, navigate, share, and make critical comments about knowledge models represented as Concept Maps. This software tool is free and can be downloaded from the IHMC web site together with the necessary technical support.

Key words: collaboration, digital literacy, learning

Introduction

The aim of our project is to contribute to the development of mutual understanding and tolerance by bringing together youngsters from different EU countries. We want to break down the stereotypes and find out about foreign countries. We would like to discover aspects of common history and find similarities among countries. We also put emphasis on promotion and maintenance of our national and regional traditions.

The main aim of our project is to find out the similarities and differences concerning every country. Students find out where the partners live (their towns, regions and countries). They get familiar with the local authorities, the outline of history and geography of each participating country. They present collected information in conceptual maps and so they will improve their IT skills. By getting to know the partner' country better, students have a chance to verify the stereotypes as well.

We believe that the project will help us to break down language barriers and stereotypes about our nationalities. The participation of our schools in this project will also be a means of promotion of our schools in the local communities.

Students use new technology during realisation of the tasks of the project, improving their ability to efficiently search for information on the internet. They create a net of conceptual maps that will provide participants with knowledge and therefore enhance tolerance and mutual understanding.

Other crucial goals of this project are improving language skills and enhancing knowledge. We want to motivate students, to learn English language as well as Spanish and Portuguese.

Background

In past centuries constructivist ideas were not widely valued due to the perception that children's play was seen as aimless and of little importance. Jean Piaget did not agree with these traditional views, however. He saw play

as an important and necessary part of the student's cognitive development and has provided scientific evidence for his views.

Formalisation of the theory of constructivism is generally attributed to Jean Piaget, who articulated mechanisms by which knowledge is internalised by learners. He suggested that through processes of accommodation and assimilation, individuals construct new knowledge from their experiences. When individuals assimilate, they incorporate the new experience into an already existing framework without changing that framework.

Some historical figures who influenced constructivism have been Vygotsky, Bruner, Simon, Watzlawick, Morin and Ausubel among others. David Ausubel American psychologist born in New York, studied at the N.Y.U., and was a follower of Jean Piaget. One of his most significant contributions to the field of psychology and learning was the development and research on advance organisers (since 1960).

In the 1960s, Joseph D. Novak (1993) at Cornell University began to study the concept-mapping technique. His work was based on the theories of David Ausubel (1968), who stressed the importance of prior knowledge in being able to learn about new concepts. Novak concluded that "Meaningful learning involves the assimilation of new concepts and propositions into existing cognitive structures" (Plotnick, 1997).

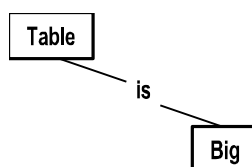
Novak said: Three ideas from Ausubel's Assimilation Theory emerged as central to our thinking. First, Ausubel sees the development of new meanings as building on prior relevant concepts and propositions. Second, he sees cognitive structure as organised hierarchically, with more general, more inclusive concepts occupying higher levels in the hierarchy and more specific, less inclusive concepts subsumed under the more general concepts. Third, when meaningful learning occurs, relationships between concepts become more explicit, more precise, and better integrated with other concepts and propositions. In our discussions, the idea developed to translate interview transcripts into a hierarchical structure of concepts and relationships between concepts, i.e., propositions. The ideas developed into the invention of a tool in 1972 we now call the "concept map" (Novak, Cañas, 1996).

It is important to note that constructivism itself does not suggest one particular pedagogy. In fact, constructivism describes "how learning should happen", regardless of whether learners are using their experiences to understand a lecture or attempting to design a model airplane. In both cases, the theory of constructivism suggests that learners construct knowledge. Constructivism as a description of human cognition is often associated with pedagogic approaches that promote learning by doing.

Conceptual Maps: general meaning

Conceptual maps are tools which are used to organise and represent a body of knowledge, "a technique to represent knowledge in graphs" (Lopes et al, 2007:180). They include concepts, usually involved in circles or boxes, and the relationships between them or proposals, which appear as a line, containing one word that connects two concepts. That word (link) specifies the relationship between the two concepts, giving a meaning to the relationship. The construction of conceptual maps can help students and educators to grasp the significance of the materials which they are learning.

In its simplest form, a conceptual map is only two "concepts" linked together by a single-word "proposal" in order to form a "proposition". For example, "the table is big" can be represented by a conceptual map composed of the two concepts "table" and "big", linked by the proposal "is" to produce a simple proposition of valid concepts relating to "table" and "big".



One feature of conceptual maps is that the concepts are represented in a hierarchical way, with the more general concepts at the top of the map and the more specific ones arranged hierarchically beneath. The hierarchical structure for a particular field of knowledge also depends on the context in which this knowledge is being implemented or considered.

Another feature is the inclusion of conceptual lines which cross each other. These show relationships between concepts (propositions) from different fields which exist in the same map. The links help to show how some

areas of expertise represented on the map are related to each other. In the creation of new knowledge, these links often represent a great creative leap by the author.

Conceptual maps are so flexible that they allow many different uses, methods and subjects, "just as there are many possible uses of concept maps within the classroom activities, there are a variety of "starting points" for the construction of the initial concept maps by students" (Novak et al., 2006).

There are two characteristics of concepts maps that are important for developing creative thinking: a hierarchical structure that is represented in a good map, and the ability to search for and characterise links. Specific examples of events or objects can be added to a conceptual map is, and these can clarify the meaning of a particular concept. According to Novak et al. (2006) in learning to construct a concept map, it is important to begin with a domain of knowledge that is very familiar to the person constructing the map. These authors think it's important to recognise that a concept map is never finished.

Collaborative learning through conceptual maps

The society of information and communication in which we live, ever gives more emphasis on cooperation and collaboration. The terms cooperative and collaborative sometimes appear used indiscriminately, because both share the idea of "working with", and the difference in how the procedure takes place (Carvalho, 2007). According to Henri & Rigault, in a cooperative approach the tasks are divided by the members of the group and are conducted individually, in a collaborative approach those tasks are performed by everyone in a continuous sharing, dialogue and negotiation. For Ausubel, Novak and Hanesian (apud Cañas et al., 1997), collaborative learning is an activity in which students and teachers cooperatively build a model of explicit knowledge.

Throughout history, conceptions about human cognition and learning have been linked with developments in technology (Burke & Ornstein, 2001) and software tools can work as students' intellectual partners, allowing stimulation and facilitation of critical thought and a superior order of learning (Jonassen, 2007:21). Vygotsky emphasised the role of mutual commitment and sharing in the construction of knowledge. According to this perspective, learning is more a matter of participation in a social process of constructing knowledge rather than an individual effort. Knowledge comes through a network of interactions and is distributed and mediated between those who interact (human and tools) (Cole and Wertsch, 1996).

The parallels between our psychological understanding and available technology is remarkable when we talk about collaborative learning assisted by computers, where the technology converges with the psychology, pedagogy, the philosophy and sciences. ICT encourages working cooperatively and can help to change attitudes, skills, concepts and cognitive processes, "their educational potentialities go from the simple distribution of information to the sophisticated learning tools" (Moura, 2007: 133). Roschelle (1994) proposed the concept of *collaborative technology*, defined with reference to an expected goal: building common modes to see, hear and act. This author argues that technology can be a way for society to resolve its uncertainties and construct common practices. Thus, the CmapTools is a tool that enables individuals to engage jointly in the production of an active sharing of knowledge (Waldegg, 2002).

Both the socio-cultural theory and located cognition have contributed to understand learning mediated by the computer. The research on Computer-Supported Collaborative Learning (CSCL) combines technology with the current theories about collaborative learning and mediated learning.

The collaborative construction allowed by CmapTools is helping to create environments for collaborative learning, with the possibility that the knowledge network can be expanded at any time. These environments enable exchanges and interactions that allow significant learning so that when two or more people cooperate in an activity, there is what Vygotsky (1987) called a "mediation process" which makes possible the restructuring of knowledge (apud Moreira, 1999). For Jonassen (2007:76) semantic networks can work as a learning tool and can provide multiple learning functions in the classroom. The author presents four examples to keep in mind: study guides, integration of knowledge, planning and evaluation method.

Working collaboratively with conceptual maps provides both teachers and students with a platform through which they can communicate with classmates or friends in distant places, exchange work, conduct investigations and act as if there were no geographical boundaries. In addition, it improves their critical thinking, higher cognitive processes and other skills.

Study description

The main goal of integrating conceptual maps into Portuguese and Spanish classes was to explore the potential of this tool (CmapTools) as a resource and educational strategy. The intention was to create situations of collaborative learning, to check the importance of the integration of conceptual maps in the process of teaching and learning as a way to support and complement the development of essential cognitive skills. This experience helped to promote the use of technology in class, the dissemination and sharing of knowledge through cultural and linguistic and collaborative involvement of the students.

The learning techniques implemented in this project were essentially related to group work and the creation of conceptual maps. The main indicators relating to group work were: investigation, participation and integration, and those relating to conceptual maps were: concepts, propositions, linking relationships and hierarchical organisation.

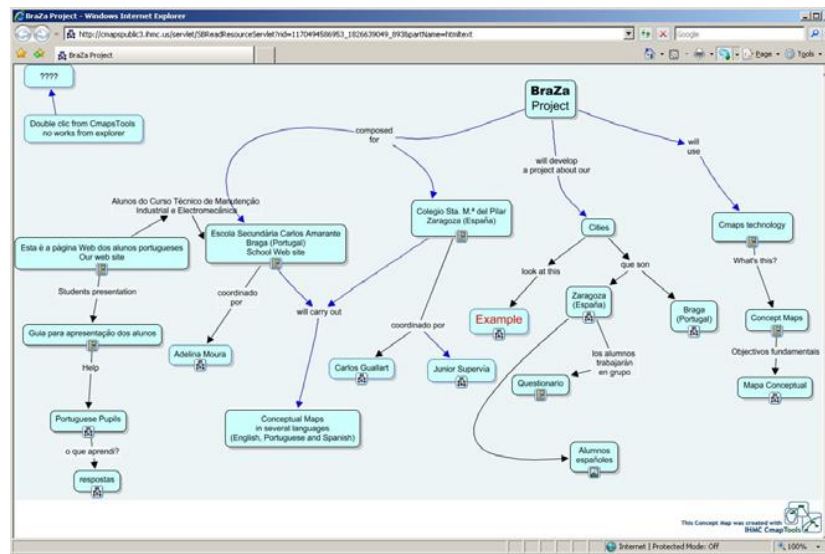
This project was developed in four main stages. The first stage consisted of showing the students the IHMC CmapTools software that they needed to use in the project, and of setting out the main objectives of the work. The features of this software were very important to the success of this project. In an educational context, conceptual maps have versatile uses across many subjects and they promote cognitive flexibility and increase collaborative work. Students can generate their own knowledge and learn to work co-operatively.

The second stage was to present the project's proposals to the students and to challenge them with the idea of working with foreign students and learning other languages. The topic for collaborative discussion was the Baroque style because the cities of Braga, Portugal and Zaragoza, Spain have several monuments in this architectural style, so it was an opportunity to study and share this remarkable architecture. But they also needed to research about gastronomy, traditions, and cultural events of both cities to share the information with each other.

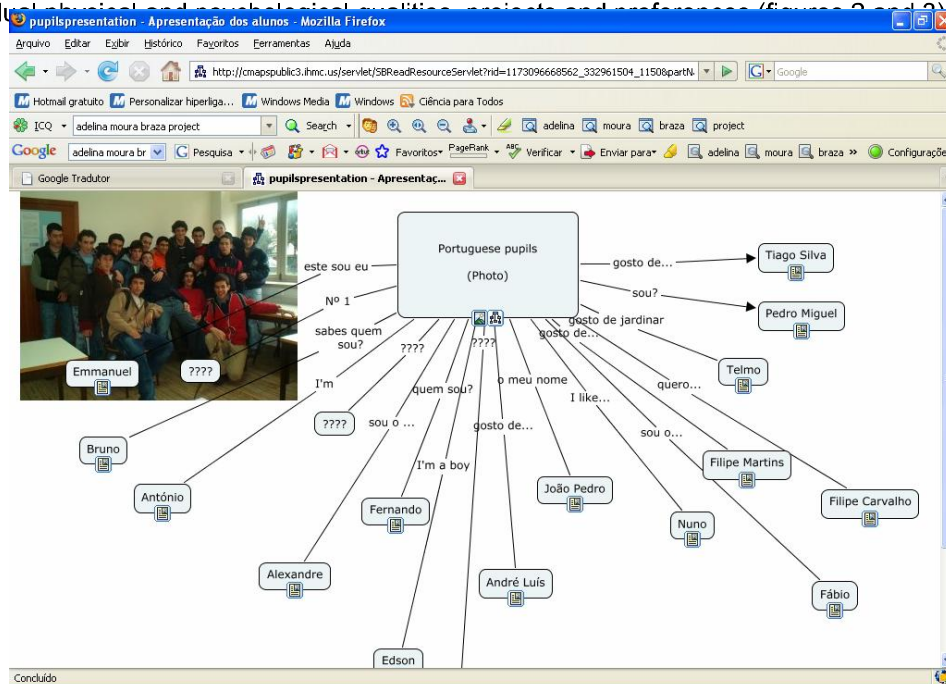
The aim of the third stage was to present the tool to students and for them to start exploring how to work with it and create conceptual maps. It was necessary to install the software on all school computers and let the students experiment before doing the main work. During the first two lessons, the Portuguese students worked with the software to learn how to use it and perform some tests to understand the potential and results of its use. The teachers who planned the project liaised by email and chat as they monitored its progress.

The fourth stage was achievement of the project. The first conceptual map was created by the Spanish teacher and it formed the homepage¹ (figure 1) of the project. A general outline of the essential elements of the project was put here. From this page other pages were created and linked. Students had a user ID and password that allowed them to work from home, school or anywhere else. This gave the students autonomous use of the tool, and at the same time gave them a sense of responsibility regarding the correct use of a common shared workspace. During this stage the students performed research and did fieldwork by recording interviews and collecting photos and videos which were subsequently used for graphical representation through the conceptual map.

¹http://cmapspublic3.ihmc.us/servlet/SBReadResourceServlet?rid=1170494586953_1826639049_893&partName=htmltext



The students of the two classes began by creating a conceptual map where they introduced themselves, stating various individual, theoretical and practical knowledge, projects and preferences (figures 2 and 3).



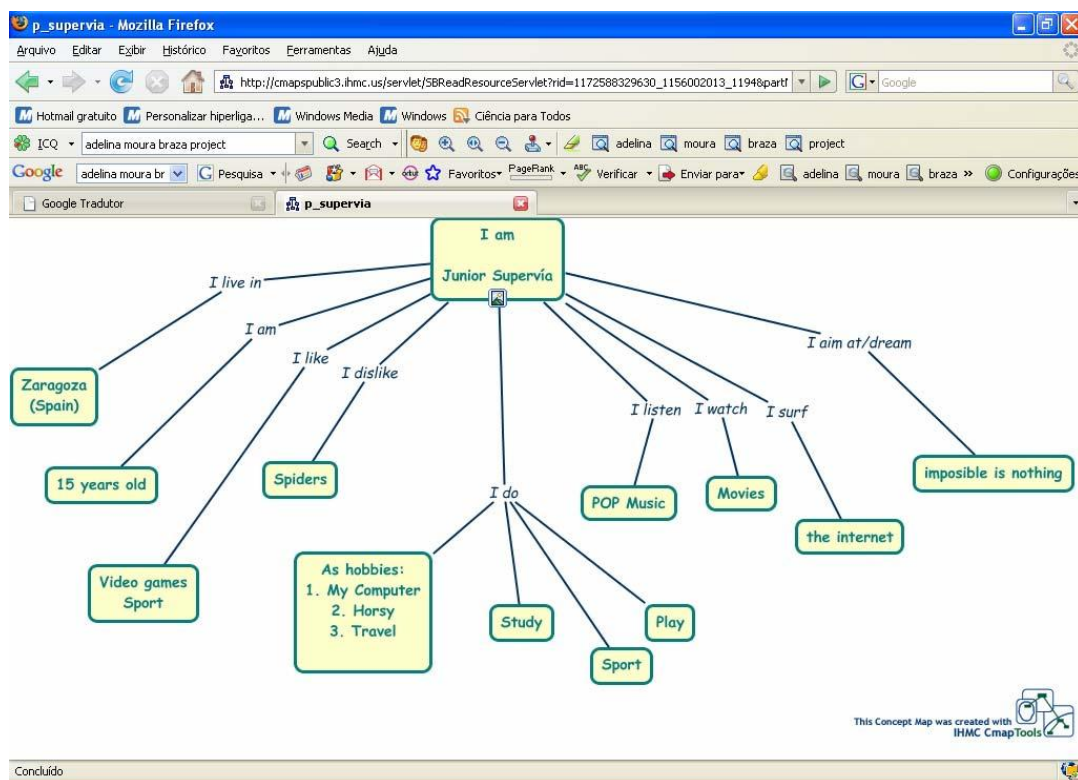


Figure 3 – Spanish students' presentation

After this introductory phase, the combined group of Portuguese and Spanish students was divided into groups, each of which investigated one of the four topics: Baroque style monuments, traditions, culture, gastronomy and school (figures 4 and 5).

Throughout the construction phase of the conceptual maps it was necessary to guide the students closely, because they had the tendency to introduce long texts in the concepts, to create a large inventory of concepts, to ignore the linking relationships and they didn't introduce cross links in the contents illustration. To overcome all of these limitations some good examples of conceptual maps were shown to the students.

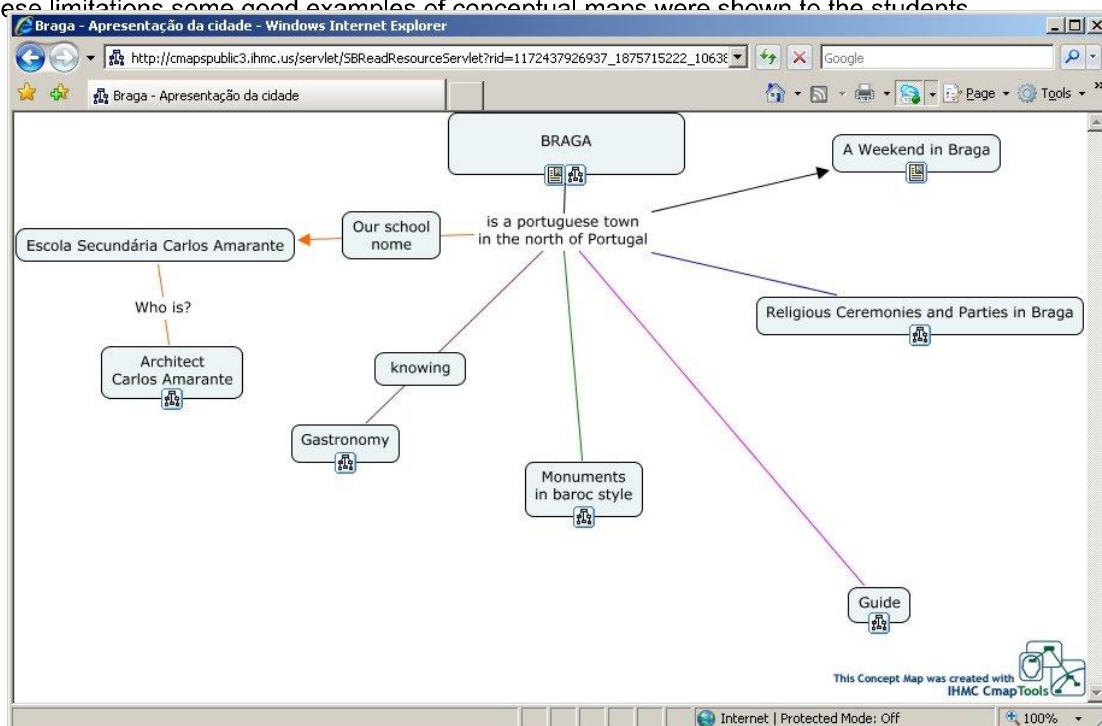


Figure 4 – Portuguese town's presentation

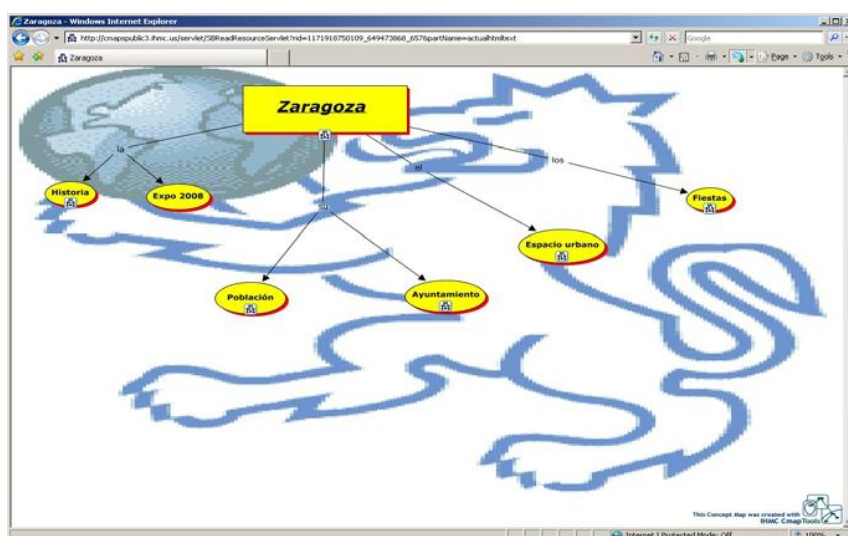


Figure 5 – Spanish town's presentation

Sample characterisation

The sample comprised 16 Portuguese students from Carlos Amarante Secondary School, in Braga, and 20 Spanish students from Santa Maria del Pilar School (marianistas) in Zaragoza. All the Spanish students were from an urban area, whereas only 44% of the Portuguese were from urban areas.

The first survey results showed that 94% of the combined group of Portuguese and Spanish students has computers at home, but only 56% of the Portuguese students have an internet connection compared to 100% of the Spanish students. All the Portuguese students said they like to use both the computer and the internet and 89% of the Spanish students said the same. Most work with computers at home. The majority (75%) of the combined student group feel very comfortable working with computers and surfing the internet.

As regards the time spent performing different activities on the computer, 49% of Portuguese students spend between five and six hours a week for leisure. By comparison the Spanish students spend less time using the PC for leisure, 21% spend less than an hour a week, 26% spend between 2 and 3 hours and 37% spend between 4 and 5 hours. Only 16% spend longer per week than this. Computer time devoted to school work was fairly similar with both groups. The majority (62%) of Portuguese students spends two or three hours per week for academic work and 58% of the Spanish students also spend this amount of time.

When analysing the home usage of computers, 40% of Portuguese students said they use theirs for browsing, researching, communicating and working, while 33% said they use it only for work and 13% said they only use it for communications. For the Spanish students, distribution was more even, with 25% using it for communications, 25% for school work, 20% for research and 30% for games or other activities. As regards the use of the computer at school, all Portuguese students reported that they use it to query, search and perform school work and 38% reported that they also used it for communications. The majority of Spanish students (63%) use the computer at school to work in curricula activities with 16% using it for communications.

In this characterisation we noted the sample conditions and the motivation of the students regarding the use of computer and the internet and we inferred that the majority of both Portuguese and Spanish students had the basic knowledge to develop the project both at school and at home.

Data collection

In order to collect quantitative data, two survey questionnaires were used, each with some open questions and some closed ones. The first survey was conducted at the beginning of the project and both classes responded to it, the Spanish students doing it via the web. This survey focused on computer literacy and individual and group work.

The second survey was conducted at the end of the project and only the Portuguese students participated. This survey focused on the use of the CmapTools software.

In order to evaluate the project, we used the following indicators:

- computer literacy and individual and group work
- collaborative work through conceptual maps

Both indicators were obtained from the surveys. The feedback from students has been very positive and the survey results show that they are very satisfied with this new educational tool.

Data analysis

As mentioned, the initial questionnaire focused on computer literacy, plus individual and group work. It helped us to determine the students' skills regarding the use of computer as a tool for communication and work. It also showed their degree of motivation to work individually and in groups.

The second questionnaire was designed to find out about the use of the CmapTools software, and focused on three aspects of the project:

- Usability of CmapTools
- Understanding of the software by the pupils and their degree of satisfaction with it, and
- Suitability of the software for the task in hand.

To indicate the degree of agreement or disagreement we used a Likert scale with 3 options: disagree, uncertain, agree. This questionnaire was answered only by Portuguese students because the mismatch of the school calendar in both countries.

Usability of CmapTools

The usability aspect of CmapTools was split into two sub-divisions: ease of handling, and operation of the software and its interface.

As regards ease of handling (table 1), most students (94%) considered it to be easy to use and therefore the majority (75%) did not experience any difficulties in implementing desired actions. The design of conceptual maps and addition of images and colours was considered easy by the majority of respondents (87%). Most (62%) also indicated that its controls were easily identifiable. These results show us that the choice of this tool was appropriate to the target audience and to the set objectives of the project.

Table 1. *Ease of handling of CmapTools (N = 16)*

Item	Disagree		Uncertain		Agree	
	No.	%	No.	%	No.	%
This software is easy to use	0	0	1	6	15	94
It is easy to implement desired actions	1	6	3	19	12	75
The design of concept maps and placement of images and colour is easy	0	0	2	13	14	87
The controls are easily identifiable	0	0	6	38	10	62

With respect to the operation of the software and its interface (table 2), the majority of students felt the software interface was nice (87%) and intuitive (62%), with adequate organisation of the menus (88%). Most (87%) considered that installation on the school laptops was simple and that it worked well.

Table 2. *Operation of CmapTools and its interface (N = 16)*

Item	Disagree		Uncertain		Agree	
	No.	%	No.	%	No.	%
The software interface is nice	2	13	0	0	14	87
The organisation of the menus is adequate	1	6	1	6	14	88
This software is intuitive	0	0	6	38	10	62
It works well on the school computers	0	0	2	13	14	87

Understanding of the application and level of satisfaction

In the next part of the survey, the students' understanding of the application, and their degree of satisfaction with it, were treated as two sub-categories. Table 3 relates to their understanding. The vast majority stated that this tool makes it easy for them to work together and participate in all activities (88%) and to develop their skills (70%). The ability to link various conceptual maps was considered advantageous by 81% and 88% liked the ability to attach other types of multimedia resources. This led us to conclude that in essence the students

understood the purpose of the tool. Asked whether the application encourages collaborative learning, 88% of the respondents agreed.

Table 3. *Understanding of CmapTools by the students (N = 16)*

Item	Disagree		Uncertain		Agree	
	No.	%	No.	%	No.	%
It is easy to participate in all activities	1	6	1	6	14	88
It is easy to develop skills	0	0	4	25	12	75
The ability to link several maps is beneficial	1	6	2	13	13	81
The ability to include other types of resource is beneficial	1	6	1	6	14	88
This tool encourages collaborative learning	1	6	1	6	14	88

Table 4 records their opinions about their satisfaction with the use of the tool. The entire sample said that it is easy to create conceptual maps with the CmapTools. Most (74%) said that they were able to concentrate better when they worked together to create conceptual maps, and 81% said that they enjoyed using this tool to present the information that they had collected. Most respondents (94%) felt that using this software made it fun to learn, and 70% said that in the future they will continue to use it.

Table 4. *Satisfaction with the use of CmapTools (N = 16)*

Item	Disagree		Uncertain		Agree	
	No.	%	No.	%	No.	%
It is easy to create conceptual maps with this tool	0	0	0	0	16	100
I felt that creating conceptual maps improved my concentration	2	13	2	13	12	74
I liked using conceptual maps to present the information we had collected	1	6	2	13	13	81
Using this software made it fun to learn	0	0	1	6	15	94
I want to continue to use this software	0	0	4	24	12	70

Suitability of the software for the task in hand

Regarding the suitability of the software for the task in hand (table 5), most students (74%) liked using it for group working, and the majority (81%) considered that the completed conceptual map looked very attractive. All students felt that the software was suited to the work that had to be done. When asked if they would like to have produced the conceptual map alone, 56% of the students responded positively, which in a way reflects a lack of organisation of work within the group, as mentioned by elements of two groups: "the organisation was not the planned, there was a lack of synchronisation" (005), "the work itself was organised, the group was not able to organise the work because it was the first time" (001). When asked about whether the representation of knowledge through conceptual maps had been a waste of time, most students (81%) disagreed and 69% agreed that the software caused all members of the group to carry out their share of the work.

Table 5. *Suitability of the software for the task in hand (N = 16)*

Item	Disagree		Uncertain		Agree	
	No.	%	No.	%	No.	%
I liked using this software for group working	2	13	2	13	12	74
The completed conceptual map looked very attractive	0	0	3	19	13	81
This software was appropriate to the task in hand	0	0	0	0	16	100
I would have liked to have done the conceptual map alone	2	13	5	31	9	56
Representing knowledge through conceptual maps was a waste of time	13	81	2	13	1	6
Using CmapTools caused all members of the group to share in the work	4	25	1	6	11	69

Organisation of group work

In this part of the questionnaire we asked open questions about the organisation of work, distribution of tasks, negotiation and leadership. When the respondents were asked about the functioning of the group in this work, 70% of the students were positive about the organisation of the work: "First we set the tasks for the group" (003), "The various tasks were organised so that all students had the maximum opportunity to become familiar with using CmapTools" (014) "the project was divided into tasks such that each student did an equal share of the work" (009).

As for the distribution of tasks, the students felt that all elements were distributed almost equally, "Everyone wanted to do the same tasks but we got together and negotiated" (015), "we spread the work among everyone and each person did their part and made the project work" (007). As we see, in the last transcript, the students easily worked cooperatively.

On the existence of negotiation within the group, most of them said that it existed: "we negotiated which images to use in the maps and how we could do it" (016), "all opinions were considered in the negotiations" (002), "sometimes it was difficult but we always managed to come to an agreement" (008).

Finally, we had to determine how to select a group leader and what their role should be. Three students did not respond, two felt that the chosen leader was bad and four students said that they did not consider that a leader was necessary because everyone in the group had a voice to express their opinions. The rest felt that having a leader was a good idea but felt that it was not always easy to implement, "It wasn't easy because nobody wanted to be selected, but we took a democratic vote and the person with the most votes was chosen as leader the group" (006).

Accordingly, we believe that this tool promoted collaboration through the division of work, negotiation and leadership, while at the same time promoting significant learning and cognitive flexibility.

Asynchronous communication among both classes

The Spanish and Portuguese students also had the opportunity to meet for two synchronised discussion sessions in MSN Messenger. The two classes were divided into four groups each of which had a different topic to discuss. These were about school, the use of ICT at school, sport and information about their home towns. Below we present only a sample of each chat. These topics were chosen by both classes.

Analysing the chat, there seem to have been some language problems in all the sessions. Both groups had some difficulty understanding the other's national language, despite the similarity of the two languages. They tried to use English as the main conversation language. Some groups communicated well through the English language but in other groups there were some problems because some of the Portuguese students do not study English at school, only French.

In general the students of both countries loved to talk despite the difficulties of understanding each other's language.

Spanish students' work organisation and perceptions

From the beginning the Spanish students showed great enthusiasm for the project, even though they experienced some difficulties. Their computer room was not always available because it had to be shared with other students. This meant that they could not always adhere to the work schedule agreed with their Portuguese colleagues. Nearly all students have their own computer at home and could continue to work there, but this defeated the aim of working in a group and interacting with others. Finally, we had to combine these two systems, coordinating them in two coordinating sessions during some class time.

Another initial difficulty was having to work in two different languages. This was soon solved because Junior Supervia, one of the Spanish students, has Portuguese relatives living in Braga city, which where Carlos Amarante school is situated. Junior knows the Portuguese language quite well and we could create bilingual conceptual maps (Spanish and Portuguese) to make the process of communication with the Portuguese students easier and anyway we always could use the English language, although it was initially rejected. Junior made a very important student-coordinator role, supervising all tasks and helping with the translations into Portuguese.

We worked at steady pace but were occasionally interrupted by other unavoidable school activities.

The Spanish and Portuguese students communicated via text chat. Because they were not being directly supervised by a teacher some of them were less productive than others. They occasionally took advantage of the situation and chatted about subjects which they considered were more interesting than the project. This is typical of teenagers. It takes them longer to become intellectually disciplined and they are easily distracted from academic matters by various things depending on their age.

Overall the students were very positive about the project despite the difficulties mentioned earlier and they wish to further investigate this topic. The academic year 2007-2008 will be more structured and will be divided into different classes with diverse subjects and teachers.

One of the great advantages of this project was the ability of students from two countries to work together on common topics. It was even suggested that the Spanish students might visit Braga to personally meet their Portuguese pals. Unfortunately it was impossible to organise this due to an already-full academic calendar for Spanish school. The distance between Braga and Zaragoza is such that any worthwhile trip would take at least two days.

Finally, the students liked the activity very much, were very interested in working with it and even wanted to keep working during their relaxation periods during its development.

We would like to include here the assessment of the project by a student who was a coordinator of this project:

"As far as my pals and I are concerned, the Braga project has been enriching. It was a new experience to use the internet to work with students in a foreign school and to get to know them by chatting online and by seeing photos. It felt like a mini-exchange. Knowing that the explanatory tables we produced would appear on the internet motivated us to complete the project. In conclusion, I think that the possibility of continuing with this kind of project should not be ignored because, on one hand it has an educational character and on the other it is really enriching in a cultural sense. On a personal level, the students support our teachers in continued work on this project".

Future Trends

Conceptual maps are valuable tools which greatly help students with significant learning. CmapTools allow not only the building of conceptual maps and sub maps with very diverse links, but also the sharing and negotiation of ideas and knowledge from everyone's contacts on the Web. According to Jonassen (2007) conceptual maps are excellent cognitive tools to develop complex thinking. It is essential that further experimental studies are undertaken in their various forms of use, construction and implementation as well as their use at different levels within the education system and with students of different ages. As it is a strategy to help to learn and organise learning materials, their dissemination through experiences or studies is important

Conclusion

We often saw that some students had difficulties understanding, assimilating, interpreting and applying knowledge to specific situations relating to different topics. Different techniques may be used to help them to remedy these problems. In this context, conceptual maps can be helpful by allowing the logical and structured organisation of thoughts thereby facilitating the selection, extraction and separation of meaningful information from superficial information.

With this study we confirm the involvement and commitment of the students in activities supported by technology, either as a resource, or as a pedagogical and methodological strategy. The integration of conceptual maps in the process of teaching / learning skills helped to develop motor and cognitive skills, to transform the student from information consumer to the organiser of the information. This study also demonstrated that students could easily build conceptual maps because CmapTools is very user-friendly software. The understanding of the application was quickly developed and the level of satisfaction of users was great, which encouraged collaborative learning and graphical representation of knowledge. The suitability of the tool to the work at hand was also an added value, making tasks more attractive. In addition to being an assistant to "learning to learn" is an excellent tool to help organise knowledge through concepts and keywords, because as we said, the conceptual map can be seen as an organised collection of propositions, listing a number of topics.

Fostering collaborative learning was also an objective of this project. However, it is always important that the teacher guides students to work collaboratively. With this tool, students worked collaboratively and they had the opportunity to share their work with friends and colleagues and to receive feedback and comments

This experiment was successful for both classes (Spanish and Portuguese students) because it has given the pupils the ability to develop different skills. It enabled significant learning even though the students were in different physical space. Communication and information sharing with young people from another country was perhaps the most important element of this project because of the importance that communication and data sharing have in this era of globalisation.

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