Using Multimedia in the Mobile Collaborative Learning

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The literature presents new perspectives for the collaborative learning through the use of mobile devices. This subject has being widely discussed by education and computer science researchers, showing as one of the strands for the future of formal and non-formal education. However, software applications in this context do not fully explore multimedia resources available at the current mobile devices. These resources could help and enrich the mobile collaborative learning. This work has the objective of presenting a new perspective for the use of multimedia in the collaborative learning through mobile devices.

Keywords mobile learning; collaborative learning; mobile collaborative learning; multimedia; MCSCL

1. Introduction

Recent researches in collaborative learning address how it could be supported not only by desktop computers, but also by mobile devices. This new front of research, named mobile collaborative learning, explores the use of such devices for learning; and tries to understand how the mobile devices can improve the education at all. These studies has pointed out that mobile technologies have several characteristics and peculiar capabilities that in fact could contribute to develop learning activities. Nevertheless, new solutions and creative approaches should be developed in order to adequately explore the resources and inherent characteristics of these devices.

Regarding collaborative learning, mobile devices can be used to provide resources (computational environments) for users interact and communicate effectively in their daily lives. However, nowadays the collaborative interaction developed in mobile learning environments occurs mainly through text instant messages. As the mobile devices have limited size if compared to computers and notebooks, usually their input and output interfaces are restricted. In general, these restrictions demand great efforts from the users even in simple tasks, such as to type small text during a collaborative process. Alternative medias could be adopted in order to provide an agile user collaboration, once this is a dynamic activity and the users need simplified interaction mechanisms to perform it. Moreover, the collaborative learning can be enriched with other forms of expression (e.g. image, audio and video), generating new possibilities for users to express their ideas through the mobile environment.

In this perspective, this work proposes the use of multimedia as an interesting alternative to deal with the interaction and collaboration restrictions of the mobile environments. So, this work has the objective of presenting a new perspective for the use of multimedia in the collaborative learning through mobile devices. It is intended to contribute mainly for the evolution of the design of mobile learning applications with design solutions that aims to stimulate users’ autonomy and the use of multimedia resources as the basis of the collaborative sections. The approach employed is based on the inclusion of audio-visual resources as the basis of the interaction at the collaboration, in opposition to alternatives that provide these resources as a complement (or an extra resource) to the text based collaboration. Thus, is presented the design decisions and a prototype with the goal of investigating how the image, audio and video resources could contribute to the improvement of the mobile collaborative learning activities.

This paper is organized as follow: Section 2 addresses the mobile collaborative learning; Section 3 presents use of multimedia resources in the collaborative learning background; Section 4 presents the proposed approach for the use of the multimedia in the mobile collaborative learning and illustrate the developed prototype; Section 5 shows a briefly evaluation of the approach and compare with the main related works; finally, the last section presents the conclusion and further works.

2. Mobile Collaborative Learning

Learning can be seen like something socially built as the collaborative construction of knowledge. According to Dillenbourg [1] we cannot set a precise or exhaustive definition for the collaborative learning. In summary, it is

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a situation in which two or more people learn or attempt to learn something together interacting in a collaborative way. His work describes a situation in which particular forms of interaction among people are expected to occur, which would trigger learning mechanisms. Hence, a general concern is to develop ways to increase the probability that some types of interaction occur. Furthermore, in the collaborative learning must have situation, interactions, processes and effects.

Stahl et al. [2] pointed out that the collaborative learning involves individuals as group members, but also involves phenomena like the negotiation and sharing of meanings, including the construction and maintenance of shared conceptions of tasks, that are accomplished interactively in group processes. The basis of the collaborative learning is in the interaction and exchange of information. Therefore technological mediums (hardware and software) that allow this interaction in an easier and simple way can contribute to become this process more dynamic and effective. Collaborative learning through mobile devices has been investigated mainly because of the agility and mobility offered by these devices. Mobility has changed the contexts of learning and modes of collaboration, requiring different design approaches than those used in traditional computational system development to support teaching and learning. The major conclusion of Spikol [3] is that the learners’ creations, actions, sharing of experiences and reflections are key factors to consider when one is designing mobile collaborative activities for learning.

According to Roschelle et al. [4], Mobile Computer Supported Collaborative Learning (MCSCL) is a rapidly growing field, which its intellectual activity is focused on discovering, describing, and documenting the effectiveness of specific designs for using mobile devices for learning in a collaborative way. These technologies provide new opportunities to promote and enhance collaboration by engaging learners in a variety of activities across different places and contexts. A main challenge is to identify how to design and deploy mobile tools and services that could be used to support collaboration in different kinds of settings. Additionally, Zurita & Nussbaum [5] clarify that the MCSCL activities support transparently the collaborative work by strengthening the: (a) organization of the managed material; (b) social negotiation space of group members; (c) enabling students to collaborate in groups by communication among the group members through the wireless network, that supports the social face-to-face network; (d) coordination between the activity states; (e) possibility to mediate the interactivity and (f) encouraging of the members’ mobility.

3. The Multimedia and the Collaborative Learning

The multimedia technology has transformed the way that students communicate, learn and socialize themselves; improving their skills of presentation and exploitation of the knowledge. The use of multimedia must be more and better explored in educational contexts, formal or informal, since it can contribute to a better and diversified formation of the individuals [6].

The multimedia instructional messages should be strongly used in the learning environments, because they are characterized by the exploitation of new knowledge and feelings. For Mayer [7] multimedia instructional messages is the communication using words, images (moving or not), which intends to promote a learning; according to this multimedia principle, students learn better with words and pictures than with words alone. His studies indicate that when words and images are presented on a joint, students have the opportunity to build verbal and pictorial mental models, and from that build relationships between these models. When words are presented alone, students have the opportunity to develop verbal mental models, but are less susceptible to develop a pictorial mental model and make connections between them.

The learning between the users in the software environment can be improved by using images and videos linked to texts, since this approach allows various forms of communication, interaction and expression. Thus, different media should be available for the individual in order to provide different resources to express and make his/her reasoning understandable for the group. Collaboration between learners can be benefited from representations such as images and animations, because they may have the role of referential anchors in the building of a shared understanding. With the use of the multimedia, users can employ some artifice like image, video or sound to explain their point of view quickly and easily in a context of collaborative learning [8].

The use of the multimedia in a collaborative learning environment may lead the user to ratiocinate about how to explain his/her thinking, for example, through an image; thereby creating opportunities for the development of his reasoning. Furthermore, other users of the environment can use their imagination to understand the correlation of the image, video or sound along with text and the context under study, reaching conclusions on the explanation of the ideas from the involved. In this perspective, the approach to the exploration of multimedia in a mobile application to support the collaborative learning is plausible, since all necessary resources to capture and storage of the audio-visual resources is already found in the mobile devices.
4. Using the Multimedia in the Mobile Collaborative Learning

The proposal of the prototype developed in this work is to use multimedia resources at the collaboration in a context; explaining ideas, facts or concepts using the media (audio, image and video) as a way of explanation and expression of ideas. So the proposal is not to provide functionalities in a software environment to produce video or sound collaboratively, but to use these resources. Therefore, are proposed means to make the explanation of the exact through the abstract, the art through image, audio and video helping in a process of collaborative learning between users through mobile devices.

Consequently is discussed here how the multimedia was introduced in the collaborative learning through the interfaces of the prototype. We should clarify that the development of this assumes that the media archives would have already recorded in the respective mobile devices and the software interfaces only use the media that is already available in the device. The proposed mobile software provides two main ways of collaboration for the user, formed by synchronous and asynchronous messages. The users can send both types of messages, and the synchronous are organized into chats and the asynchronous are commentaries about the chat. A set of interfaces for mobile devices was developed with the intention to organize the user interaction to support the mobile collaborative learning, through these synchronous and asynchronous multimedia messages.

In the prototype, besides others interfaces for the management of the collaborative environment, from the specific interface for sending messages, were developed an interface mechanism for the inclusion of multimedia; which provides means to include medias of the type: image, audio and video. Thus, when users are interacting in the collaboration, they may attach the media to their messages. Figure 1(a) shows an example of interaction (sending the message) using multimedia, for this, the user will need to click on the menu "Add media" to add a media to the message in the interface of messages.

In sequence in Figure 1(b), the multimedia interface appears to the user. In this interface the user can see the name of the collaboration, the text message and what type of collaboration (chat or commentary) media will be attached to this message. At this moment, the user has the option to list the three types of medias available to be manipulated in the environment, as shows the right side menu of Figure 1(b). The user can choose a media file, as illustrated in Figure 1(c). This interface displays the list of all media available in the device, given the type chosen in the menu. After that the user can visualize it, as shown in Figure 1(d) (the example shows an audio, but it could be an image or video) that presents the media after the selection. In this way, the user can attach the media to the message through an option from the menu in the interface shown in Figure 1(d).

After sending a new message to the collaboration, the media attached to the message will be available to other users. The sent message will have an icon on the interface of the collaboration, they may attach the media to their messages. Figure 2 illustrates the types of icons that will appear in the interface indicating the media added.

The icon in Figure 2(a) indicates that a picture was attached to that message; the icon in Figure 2(b) indicates that an audio was added to the message and the icon in Figure 2(c) indicates that a video was attached to that
message. Figure 3(a) illustrates the collaborative interface (chat) with the messages and the medias attached to them.

This recourse in the interface indicates if there is media attached to a message or not. In order to view the content of this media the user must select the message, access at the right side the menu option "See media". Then the media will be displayed to the user as illustrated in Figure 3(b) (interface that shows the media attached to a message). Note that with the media, the user will see the text message related to that media; He can select the option "Back" at the left side menu to return to the interface with the collaborative messages (Figure 3a). Every message of the collaborative context (synchronous or asynchronous) sent by the user in the environment may have attached to this an image, an audio or a video together with or without text. Figure 3(c) illustrates the interface of commentaries about a collaboration, presenting messages with attached media, as happens also in the chat (Figure 3a).

It is important to note that an interesting way to introduce the multimedia in the collaboration is through the attachment of the medias to the mobile collaboration messages. Given that the volume of messages that may arise during the collaboration sessions, and considering the screen size of mobile devices would be impracticable to put all these information in a single interface for manipulating the media. It is understood that the use of multimedia resources is not obligatory for the collaborative messages, but it must be provided in the interfaces of the mobile collaborative learning applications.

Finally, after having presented a proposal on how the multimedia resources could be added to messages in an environment for supporting the mobile collaborative learning it is important to make a discussion about what this approach can educationally provide for the users. Thus, the next section discusses this use and explains on some potential educational advantages that this environment can bring for users. Next section also correlates the approach with the main related works in the literature.

5. Evaluating the Approach and the Related Works

The use of the multimedia resources provides benefits mainly in exploring the creativity of those involved in the collaborative learning, because they may make associations between the messages in the collaboration with the external world, for example: to create a video for the exemplification of an idea the user will be exercising and trying to make connections of that media with the entire context of the collaboration and with the message that will be sent.

Other initiatives has already explored how to provide and share media resources in a group of users [9, 10], however they does not explicitly use the audio-visual resources inside the collaboration. In this work we highlight the importance of exploit the advantages of combine multiple media in the computing environment. Otherwise, in this work was studied the use of these resources in supporting to explain the ideas in the collaborative learning, such using it as multiple ways to explain a thought or idea in the collaboration. This approach may generate suitable means for the learning be explored in more incisive way on the daily lives of the users. The presented prototype can take advantage of the locations (places) where the users are for the collaboration and educational development of the involved group. Once users with mobile device can take advantages of the environment around them looking for explanations that exemplifying their ideas in a clear and simple way and include it as visuals resources in the collaborative mobile application.

The proposed solution allows the user the possibility to make connections between the collaborations under discussion in the software environment with their day-to-day. The users may have difficult situations during the collaboration that only the use of simple words and phrases would not be enough to express an idea or an
intention, so multimedia resources could be used as alternative methods to solve this problem. Furthermore, the use of multimedia provides a richer learning environment in that users will have an alternative to words to express themselves.

Finally, it is understood that the use of multimedia in a propitious environment to capture, to explore and to aggregate to a context or subject can generate many reflections. Since both in the development of the visual or audio "product" and in its relationship with the collaborative context which the media should be inserted; the user should reflect what media to use, and how to use it to that with this form of expression his/her ideas be understood in a practice, clear and dynamic way by other users of the collaborative environment.

6. Conclusion and Further Works

Mobile Collaborative Learning environments are in the boundaries of research in the scientific community of the area. It is essential to study and propose new ways to design richer environments in its capacity for interaction and expression in order to achieve improvements in the quality of the collaboration and in the users' experience in learning activities. In this work was presented a new perspective for the use of the multimedia in the mobile collaborative learning.

It was developed a prototype of Human-Computer interfaces with the intention of perform an exercise to investigate how audio-visual resources could be aggregated in the process of collaborative learning through mobile devices. The approach shows as an interesting alternative to deal with the mobile interaction and collaboration restrictions; the prototype presented possibilities for exploiting in this way. The features designed assist mainly the development of collaborative activities using the multimedia resources already available by the devices. They presented an interesting way to improve the learning through multimedia resources in a mobile application.

As further work is proposed a better and deeper investigation of the approach presented from a theoretical and practical point of view. Concerning the features of the prototype, improvements in design should be made, including those issues related to usability. Furthermore, it is intended to develop a case study aiming to examine in practice whether this approach really brings concrete results to the process of mobile collaborative learning.

References