

Mobile Phone Interfaces for Informal Education

Júlio Cesar dos Reis^{1,2}, Rodrigo Bonacin¹, and Maria Cecília Martins³

¹ CTI, MCT, Highway Dom Pedro I, km 143,6, 13069-901 - Campinas, SP - Brazil
{julio.reis@cti.gov.br and rodrigo.bonacin}@cti.gov.br

² Institute of Computing – State University of Campinas (UNICAMP) – Campinas, SP – Brazil

³ Nucleus of Informatics Applied to Education (NIED) – State University of Campinas
(UNICAMP) – Campinas, SP – Brazil
cmartins@unicamp.br

Abstract. The mobile computing represents a new possibility for the people “learning while doing” their everyday activities. The advent of mobile devices has created new opportunities that go beyond the simple communication; their software interfaces have a primary role in enabling the communication and collaboration among the evolved parties. In a learning environment for informal education, it is essential to design interfaces that minimize the interaction difficulties and maximize the learning activities itself. To achieve this, in this work is presented a design proposal and prototype of a mobile phone interface for mobile collaborative discussion. The proposal combines mobile learning with collaborative learning, stimulating the constitution of communities of practice aiming to promote the informal education.

Keywords: Mobile Collaborative Learning, Communities of Practice, Informal Education.

1 Introduction

Nowadays, mobile devices are present in a large range of human activities. Some researchers claim that a new connected and mobile society is emerging, with a variety of information sources and means of communication [1]. These devices can help us to perform educational and leisure activities in a collaborative way, sharing knowledge of how to perform or perform them better.

At this work, the informal education is understood as the lifelong education in which people learn from everyday experience, focusing in aspects related to our lives [2]. In the real world, most of the time we do not have lessons plans to follow, we respond to situations and experiences, as well as learn from them.

The mobile computing represents a new possibility for the people “learning while doing” their everyday activities. The advent of mobile devices has created new opportunities that go beyond the simple communication between people. There are new learning scenarios that can be supported by mobile devices, given that these devices can be present at anytime and anywhere. Therefore, by using mobile devices, it is possible to increase the educational development “out of school” by sharing knowledge and experiences about the situation that someone is living at the same time. However, subjects related to this type of education normally are diverse and

comprehensive, consequently are necessary technological solutions that allow the involved people interact and act in a collaborative way.

At this context, interfaces have a primary role in enabling communication and collaboration among the evolved parties. In a learning environment for informal education, it is essential to design interfaces that minimize the interaction difficulties and maximize the learning activities itself. One big challenge is to deal with the devices restrictions, such as: screen size, performance, and data input difficulties. Another challenge is to provide appropriated interfaces to be used at different places and situations.

This work presents a design proposal and prototype of a mobile phone interface for mobile collaborative discussion. A new approach aims to the enrichment of this interface, employing different medias and forms of interaction. The objective is to stimulate the constitution of “communities of practice” in witch members that share common problems and/or work in the same domain can interact in order to constitute “wireless” communities of knowledge sharing about any issue. Using the multimedia interfaces is possible to the practitioners share images, sounds, and videos during the discussions. At the proposed design, the resources of these interfaces are essentials to enable the practitioners to explain better their ideas.

The work is organized as follow: Section 2 presents the theoretical referential; Section 3 explain about the approach and the design requirements, conception, principles and decisions; Section 4 presents the prototype and examples; Section 5 discusses the impact of the interface design decisions to the constitution of the communities and to the promotion and development of the informal education; and Section 6 concludes.

2 Theoretical Referential

This section presents the main theoretical topics related with the proposal, explaining about mobile collaborative learning (section 2.1), communities of practice (section 2.2) and informal education (section 2.3).

2.1 Mobile Collaborative Learning

The knowledge can be understood as something socially built by members of a community or a culture. Within each group (virtual or not), participants are producers and consumers of knowledge; not only for them, but also for the common good. This knowledge is distributed among the members of this community, through social interactions, collaboration and communication [3].

Regarding the collaboration, Dutra [4] notes that collaborative learning is not only a technique of the classroom, it is a philosophy of learning in which students organize themselves into groups to discuss and evaluate issues or problems in a way not so much structured. In this philosophy there is the sharing of authority and responsibilities, so in this sense the decisions and solutions are built through the collective consensus.

Furthermore the collaboration is a shared process of creation, in which two or more individuals, with complementary skills, interact to create a shared understanding that none of them could obtain previously in an individual activity. Thus the collaboration generates social interaction and these indicate the importance

of the relationship between individual and environment in the construction of psychological processes [5].

Given that the basis of collaborative learning is in the interaction and exchange of information, technological mediums (hardware and software that allow this interaction in an easier, simple and effective way) can contribute to turn this process more dynamic and effective. Collaborative learning through mobile devices has being investigated due to the agility and mobility offered by these devices.

The mobile technologies are more embedded, ubiquitous and interconnected. With the improvement of these capabilities, the social interactions, awareness and connectivity contexts become richer. In this scenario, real and virtual environments can contribute to a more situated, personal and collaborative learning for all life [1].

According to Trifonova [6], the mobile learning can be considered as any form of learning and/or teaching that occurs through a device or at a mobile environment. The mobile learning has being considered by many researchers as an integral part of any other form of educational process in the future. Thus, there is considerable interest from technical developers and educators to explore the capabilities and features of mobile technologies in new forms of learning.

2.2 Communities of Practice

Since the beginning of history, human beings have formed communities that share cultural practices reflecting their collective learning: from a tribe around a cave fire, to a group of nurses in a ward, to a street gang, or to a community of engineers interested in some issue. Participating in these “communities of practice” (CoP) is essential to the learning process. It is the core of what makes human beings capable of meaningful knowing [7].

The communities of practice are based in the social theory of learning. According to Wenger [8] this theory integrates the components: practice, meaning, identity and community as necessary to characterize social participation as a process of learning and of knowing.

The main idea of the CoP is the individual as an active participant in the practices of social communities with common interest in some subject or problem, and that s(he) can collaborate and share ideas. These communities are in everywhere and people belong to a number of them: at work, at school, at home, and even in hobbies. “We are core members of some and we belong to others more peripherally. For example, you may be a member of a band, or you may just come to rehearsals to hang around with the group” [9].

Wenger [9] explains that members of a community are “informally bound by what they do together — from engaging in lunchtime discussions to solving difficult problems — and by what they have learned through their mutual engagement in these activities. A community of practice is thus different from a community of interest or a geographical community, neither of which implies a shared practice.” According to Wenger [9] a community of practice defines itself along three dimensions: what it is about, how it functions and what capability it has produced.

2.3 Informal Education

Jeffs and Smith [12] point out that the informal education brings back elements of an education dated to more than 2500 years ago. In ancient Greece, the education, in

general was made on the streets at events in which people learned from each other through the establishment of dialogues and discussions. Recent studies try to determine where education happens, addressing the lifelong education and for life [10]. The informal education can be seen as the knowledge of the common sense, personal knowledge or practical, largely developed through experiences [11].

It is important to note that according to Smith [2] the purpose of the informal education is not different from any other form to educate, it differs only on its scope and focus on aspects related to the common and everyday life. The informal education is related to a process of continuous learning, because you learn all the time, every day and anywhere about a wide range of issues.

Finally, for Smith [2] the informal education does not have lessons or plans to follow, unlike the formal education. The informal is done through situations and experiences, and this can occur at any place, different from the formal which is strongly linked to institutions and classrooms. It is important to clarify that Jeffs and Smith [12] reported that even in the informal or formal, you can not say that one is better than the other; it depends on the educational objectives, situations and of the context involved.

3 Approach and Design

People live in a process of continuous learning all the time and not only connected to certain places and/or institutions. This process is collective and involves mainly action, meaning, identity and social participation through communication, dialogue and collaboration. In this one, each individual must develop themselves by their contributions, with an active, engaged and practice participation, collaborating and sharing ideas about something through communities. Mobile technological mediums seems like an interesting way to develop this process, contributing to turn it more dynamic and effective because can improve agility and mobility.

This work uses the informal education as focus, as in this form of education any issue can be discussed and explored by users, and consider the mobile phone interfaces for the constitution of communities of practice aiming to promote the informal education. The use of the mobile learning can intensify the chances of learning by the user independent of time and place, creating in this way, new possibilities for the development of the informal education. In this context, mobile devices can be used by users to share and discuss issues or doubts related to situations that they experience in their daily activities. Moreover, it is supposed that individuals in the face of a new situation or problem, they could act in a more agile and flexible way through the shared knowledge by the collaborative and mobile learning. The joint of these two forms of learning (collaborative and mobile) can provide a different way for the occurrence of the informal education. These forms of learning bring peculiar characteristics that can be better exploited by a properly designed mobile computational environment.

In order to build this environment was necessary the development and organization of interaction and interfaces. Multiplies forms of collaboration must be available in the environment, beyond of it, is necessary to provide the minimum of information that must be contained on these interfaces in a simple way. The solution is not trivial,

and there must be a set of factors that lead to the educational successful of the software. For that, several requirements have to be considered such as the flexibility of the application components to fit the different contexts of collaborative use (which are numerous when it deals with informal education). Additionally, the application should provide many forms of expression. With this objective the prototype adopted various media as a form to develop a richer and fruitful collaboration.

The computational proposal presented in this work foresees that the participants must have more possibilities and freedom to interact and propose collaborative discussions on topics related to the interests and practices of the groups at the software. The goal is to provide a virtual mobile environment that can support the constitution of CoP, in this way, individuals with similar interests and practices can constitute group of collaborators. These ones can discuss an existing topic and/or open new topics of discussion according to their interests of practice.

The communities are represented by the groups in the software. They are created by users in order to organize topics related to the main group proposes. Furthermore, due to the large range of topics that can be discussed, it was created a way to organize the information in different hierarchical levels. These levels were divided into groups, topics and collaborations. The groups (communities) are the first level where there is a first division of themes, within a group there may be several topics, which is a second level of division to the themes of the collaboration, the topics are like sub-themes of the main theme (group); and within a topic may be numerous collaborations, whose their themes are according to the topic and the group in which they belong.

The groups represent the CoP and they have a vital role within the application, because it is from them that the various areas of action from the informal education may be organized. Users of a same group are people with common interests and practices in which the objective is to discuss problems and find out solutions in a collaborative way. It means that a group is a specific area of formal or informal knowledge where users can be grouped, and topics and collaborations are organized. Users will be able to join the existing groups, or create new ones, as their interest. In the next section, the developed prototype will be showed, so we can explain the ideas better through examples.

4 Prototype and Examples

The main principle behind the proposed interface design is the self organization of the groups. These groups perform discussions through collaboration sessions. At the prototype, the collaboration occurs through synchronous and asynchronous multimedia messages. A specific group of collaborators, in a discussion, can consolidate (highlight) messages that could be important to someone that may want to know a synthesis of it. The users can decide which state (situation) each collaboration is, for example any collaborator could vote if they find out the solution of a problem or not. The users can also search discussions by topic in order to know more about some problem, and give opinions (commentaries) using asynchronous messages even after the end of a synchronous session.

The development of the collaboration can start in the insertion of a new group (see Figure 1a). Within the groups can be added various topics (see Figure 1b) and within

the topics is possible to add new collaborations. Figure 1c shows the list of topics for a group called Bikes, at this interface users can choose a topic to add a new collaboration to interact through synchronous and asynchronous messages.

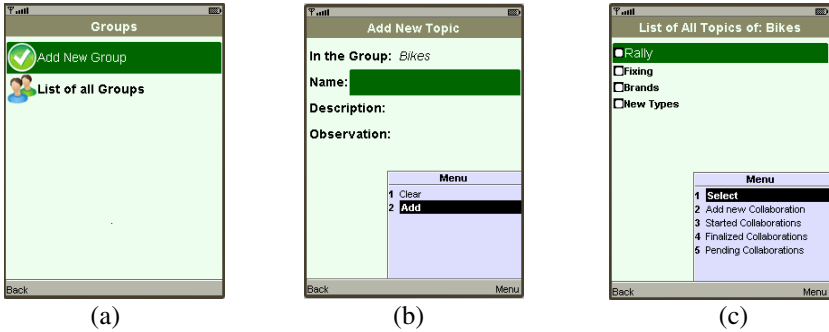


Fig. 1. Prototype's interfaces about groups and topics

In the collaborations the participants can send synchronous messages as an instantaneous chat, see Figure 2a illustrating this situation. After sending the message, it is displayed in an interface that centralizes the messages from all involved collaborators in the discussion, as shown in Figure 2b. This illustrates the interface with an example of synchronous message exchange in which users establish a communication (chat) from a defined theme – in this case "Nature and Profits" - and specify his "speech" as the type: question, answer, solution, questions, etc.

The participants themselves can also select which messages should be consolidated (highlight) during the chat and an interface as Figure 2c is generated. These consolidated messages are central because it will describe a summary of all the synchronous interaction with the most important messages selected from users on a thematic. At the interface of consolidation (Figure 2c), the messages will be organized according to their types, for example: doubt, question, conclusion, etc. Figure 2c shows an example of consolidated messages from the developed collaboration in Figure 2b.

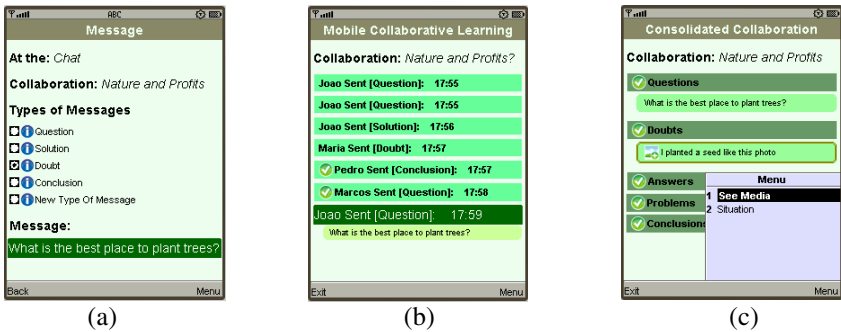


Fig. 2. Prototype's interfaces about synchronous collaboration and consolidation of messages

The occurrence of communication via asynchronous messages - as is shown in Figure 3a - is a way to add new information to synchronous collaboration developed or under development. This will be especially useful in two situations:

1. When the theme of the collaboration takes several days to be resolved, in which is necessary several rounds of synchronous interaction (online chat). In this case, the comments (asynchronous messages) may be a way to divulge possible solutions at any time during this process in the period between the online conversations (synchronous messages). These comments can then be discussed in a new round of synchronous collaboration, thus the discussions of the chat can be articulated with the comments.
2. When after the finalization of a collaboration session occur any relevant idea of an user who was not involved on it. The comments are a way to these users register and divulgate their idea for the others, contributing with the proposed theme in the collaboration.

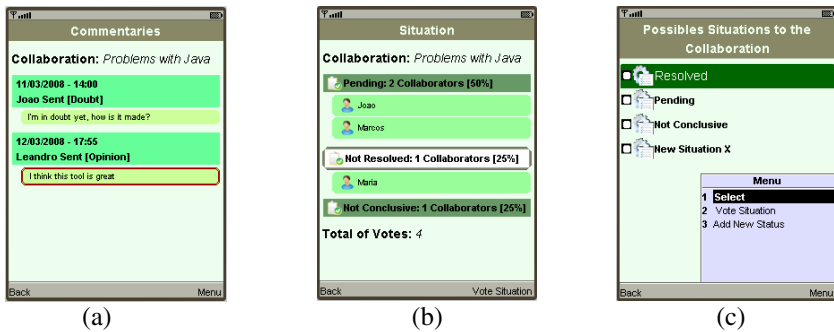


Fig. 3. Prototype's interfaces about asynchronous collaboration (commentaries) and situation of the collaborations

Another way to support the collaborative environment is the design proposal where the users can define possible "states" for the developed collaborations, as illustrated in Figure 3b. Collaborators can vote on the basis on information from the collaboration (synchronous and asynchronous messages) in which situation of the collaboration is; e.g.: resolved, pending, not conclusive, etc. These states or situations relate to what was discussed in the collaboration. The environment brings the possibility to present various final situations to a specific collaboration; the goal is that there may be a number of situations selected by users of the application, which can vote from the interface presented in Figure 3c.

Figure 3a illustrates an interface of commentaries in which users sent asynchronous messages to a collaboration named "Problems with Java." Figure 3b presents the vote done by users of the same collaboration.

Moreover, the prototype's interfaces allow to employ various medias in a collaboration. These medias are generated by users from their interaction and exploration of the external environment with mobile devices and can be added in the synchronous or asynchronous collaborative messages. By adding a new message

(see Figure 4a), the user can add a new media in that message. This media can be an image, an audio or a video.

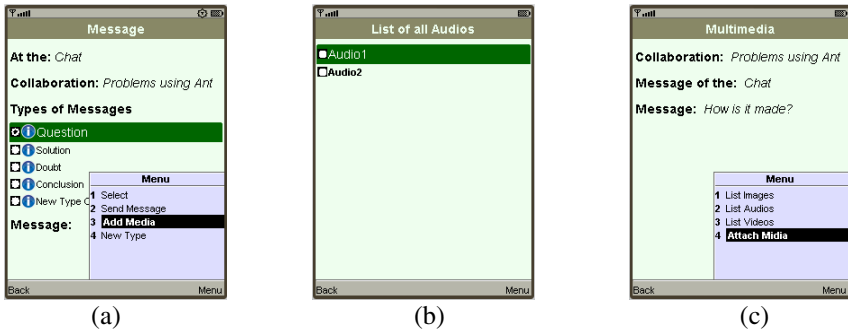


Fig. 4. Prototype's interfaces showing the interface to send messages and the interfaces to attach multimedia at the messages

The user selects the type of the media and the file (see Figure 4b), and attach the selected media to the message, as illustrated in Figure 4c. Then to send the message, the media chosen is linked to the text of the message, and other users of the collaboration will have access to this media at the main interface of the collaboration (see Figure 2b).

5 Interfaces, Communities and the Informal Education

Features designed for the environment must be represented on its interface, and it is necessary that the interfaces make sense to the users and to their context. Furthermore, the design of the features, the interaction model and its relationship with the educational activities must be well thought out. At learning in a virtual environment, the interfaces can be as a facilitator or a big problem, because if this interface is bad designed can let the educational activities unviable, but if it is well designed can provide great help and really maximize the learning results.

Besides it, to provide the development of the communities, the interface should present specific features for the satisfactorily support and management of them. The interface should provide mechanism for the users create, organize and maintain the communities by themselves. The prototype developed in this work shows a possible alternative to stimulate the constitution of the CoP through the groups. From these groups, all the organization of the application, the topics and the collaborative discussions are developed.

The themes, topics and collaborations supported by the application's interface creates conditions for the users develop the communities in a natural way. The subjects related to their daily life fits in the thematic of these communities. It is observed that the communities are the basis for the organization of themes that are part of the informal education. The design of the interface allows a particular organization which enables the establishment of these communities and therefore also

issues from the informal education, which is developed through collaborative discussions.

The interfaces allow people from specific groups discuss problems in a little structured way, since they have freedom to propose questions, interact and express. Decisions and solutions are built through interactions, constituting a “collective consensus” over the time. Therefore the interfaces encourage learning experiences in a process of communication and collaboration permeated by issues related to situations experienced in the day-to-day.

Finally, the use of the multimedia in the interface adds distinct features to the application, providing new forms of expression available to the users during the collaboration. These resources can provide benefits in the exploration of the creativity of those involved, because they can make associations between the messages in the collaboration with the external world, such as by creating a video to illustrate an idea in a message, the user will be exercising his/her reflection and trying to make connections of that media with all the collaborative context under discussion and with the message that will be sent.

6 Conclusion

Recent studies have investigated how education can be boosted and developed in any place or time. These studies aim to maximize the possibilities for learning of citizens in their daily lives. Mobile collaborative learning environments are frontiers of research in the scientific community of the area and there are several challenges in this context to obtain an improvement in the quality of the collaboration. So it is essential to study new alternatives to design richer mobile computing environments in order to improve its capacity and easiness of communication, interaction, and expression by users.

In this work was addressed aspects of design of interfaces of a computational environment to support mobile collaborative learning which allows the constitution of communities of practice. These were developed from groups and mobile collaborative discussions which aims the promotion and development of the informal education. Furthermore, it was produced a prototype whose intention was to illustrate the main ideas of the approach. From this prototype, a reflection and analysis about the role and impact of the mobile software interfaces was elucidated, and we could observe that the proposal shows a propitious scenery for the development of the informal education on the basis at the communities of practice.

As further work is proposed a better and deeper investigation of the approach presented from a theoretical and practical view. Even though the proposal is based on these aspects, research on real case studies should point out improvements and new solutions for the design of the interface in the studied context. We also propose to study the real educational benefits of the proposed approach in long period of using and include new features to the prototype, mainly to sophisticate the establishment of the communities of practice.

Acknowledgments. This work is funded by Microsoft Research - FAPESP Institute for IT Research (proc. n. 2007/54564-1).

References

1. Naismith, L., Lonsdale, P., Vavoula, G., Sharples, M.: Report 11: Literature Review in Mobile Technologies and Learning. In: Future Lab. University of Birmingham (2006), http://www.futurelab.org.uk/resources/documents/lit_reviews/Mobile_Review.pdf
2. Smith, M.K.: Introducing informal education: What is informal education? Where does it happen? How has it developed (1997), <http://www.infed.org/i-intro.htm#what>
3. Fino, C.A.: What is collaborative learning (2004), http://www.uma.pt/carlosfino/Documentos/PowerPoint_Aprendizagem_colaborativa.pdf
4. Dutra, R.L.S.: Learning Environment for the Teaching of Computer Networks Oriented to Problems. Institute of Informatics, Master Dissertation. Federal University of Rio Grande do Sul, Porto Alegre, Brazil (2002)
5. Nitzke, J., Carneiro, M.L.F., Geller, M.: Creation of environments for collaborative learning. In: X Brazilian Symposium of Informatic in Education, Curitiba/PR (1999)
6. Trifonova, A.: Mobile learning: Review of the literature. Technical Report. University of Trento. Department of Information and Communication Technology (2003)
7. Nicolini, D., Gherardi, S., Yanow, D.: Knowing in Organizations: A Practice-Based Approach. M. E. Sharpe (2003)
8. Wenger, E.: Communities of Practice: Learning, Meaning, and Identity. Cambridge University Press, Cambridge (1999)
9. Wenger, E.: Communities of Practice: Learning as a Social System: In: Systems Thinker (1998), <http://www.co-i-l.com/coil/knowledge-garden/cop/lss.shtml>
10. Bentley, T.: Learning beyond the Classroom: Education for a changing world. Routledge, London (1998)
11. Fisher, T., Higgings, C., Loveless, A.: Teachers Learning with Digital Technologies: A review of research and projects. Future Labs Series (2006), http://www.futurelab.org.uk/research/lit_reviews.htm
12. Jeffs, T., Smith, M.K.: Informal Education: conversation, democracy and learning. In: Bramcote Hills, 3rd edn., Educational Heretics Press, Nottingham (1996)