PALMA: Usability Testing of an Application for Adult Literacy in Brazil

Francimar Rodrigues Maciel

Designer, Nokia Institute of Technology, Manaus, Amazonas, Brazil
francimar.maciel@indt.org.br

Abstract. Currently in Brazil, a large number of illiterate adults want to learn to read, but few of them are being provided with opportunities to learn. They are a large audience with social barriers and limited knowledge about the usage of technology. From this scenario, studies about how to conduct evaluation to understand the user experience can contribute to design and get opportunities for creating and improving interactive learning environments. This paper seeks to present the usability testing of a mobile application for adult literacy conducted in Brazil. The Methodologies and issues for further research on M-Learning will also be indicated.

Keywords: mobile learning, usability testing, adult literacy.

1 Introduction

The era of mobility makes it easy to get information and communication in real time anywhere. At school, at home or at work, the diversity of mobile devices and the variety of prices allow the access to mobile technology for all economic classes in different age groups.

This scenario admits the development of applications for different subjects, including education. The usage of mobile devices in the teaching process, called Mobile Learning or M-Learning, presents itself as a way to complement the activities in the classroom and improve the performance of students in the learning process. That service provides a new way of learning to 10 million people around the world [1]. While mobile technology is not and will never be an educational panacea, it is a powerful and often overlooked tool – a repertoire of other tools – that can support education in ways not possible before [5].

In Brazil, the scenario of M-Learning applications is still small. In some discussions that theme is only related to Online Learning or Online Education. Most researches of this field are either experimental or limited to academic access [10].

Aiming to contribute to adult literacy through the resources offered by mobile technology in 2011, the PALMA project was created by IES2 company in Brazil – Programa de Alfabetização da Língua Materna (originally in Portuguese). This paper aims to present the description of usability testing of PALMA application performed in Manaus for one month with 10 participants.

2   Mobile Learning

2.1   Definition

Mobile Learning involves the use of mobile technology, either alone or in combination with other communication technology, to enable learning at anytime and anywhere [5].

Mobile Learning consists of a series of adaptations of technology for the learning strategy of distance education (Fig.1). Therefore, m-learning is a natural evolution of technology's adaptations applied to the concept of d-learning and e-learning) [7].
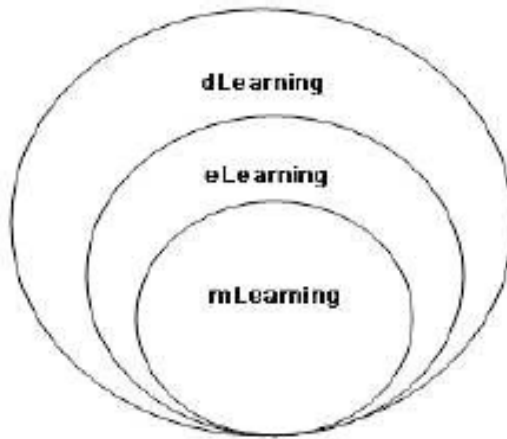

Fig. 1. The place of mobile learning as part of e-learning [7], [8]

Core characteristics can define mobile learning: spontaneous, private, portable, situated, informal, bite sized, light-weight, context aware; and perhaps soon it will be: connected, personalized and interactive [6]. PDA, Pocket PC, E-book, handheld game console, handheld audio and multimedia guides, tablet, mobile phone and smartphones are examples of mobile learning devices.

The technology presents an unique opportunity for creating, sharing, and improving quality of life. Students, teachers, people with disabilities, communities positioned in far places, a large diversity of contexts, and users can take it as a way to access educational content. Some factors must be identified and regarded with focus on the success of mobile learning [3]:

- Access to technology: the successful project make mobile technology available where and when it is needed, either by developing for users own devices such as phones and media players, or by providing learners with devices that they can use at home and on the go.

- Ownership: it is important that learners are able to either own the technology, or to treat it as if they own it. Using the technology for entertainment and socializing does not appear to reduce its value as a tool for learning, but rather helps to bridge the gap between institutional and personal learning.
- Connectivity: many successful mobile learning projects have been based on wireless or mobile phone connectivity, to provide access to learning resources, to link people across contexts, and to allow students to capture material that can sent to a personal media space and then shared or presented.
- Integration: successful mobile learning projects are integrated into the curriculum, the student experience, daily life, or a combination of all of these. One way to achieve this integration is to extend a successful form of learning onto mobile devices, such as frequently asked question, or audio/Powerpoint recordings of lectures.
- Institutional support: successful projects also need strong institutional support, including the design of relevant resources in mobile format, staff training and technical support.

Concerned in stimulating the development for mobile learning, the UNESCO researchers created in 2012 policy guidelines for helping institutions, national government and educators to think about how to use mobile technologies for education. The latest version was updated in early 2013 and recommends:

- Create or update policies related to mobile learning;
- Train teachers to advance learning through mobile technologies;
- Provide support and training to teachers through mobile technologies;
- Create and optimize educational content for use on mobile devices;
- Ensure gender equality for mobile students;
- Expand and improve connectivity options while ensuring equity;
- Develop strategies to provide equal access for all;
- Promote the safe, responsible and healthy use of mobile technologies;
- Use mobile technology to improve communication and education management;
- Raise awareness of mobile learning through advocacy, leadership and dialogue.

2.2   The Context and Environment Relevance

Knowing the environment and its elements is a fundamental process to develop projects, comprehend the specificities about how people use mobile technology to learn (and if they do not, why) and evaluate the users main needs. It makes it possible to know and have access to all stakeholders, teachers, coordinators and assistants, everybody is important in the learning process. Those components present cultures, values and thoughts, essential points to create contextual tools and tasks to promote engagement through the study of their own conditions.

According to Saccol et al. [2], Sharples et al. [3], these different types of contextual mobility can be understood through:

- Learners' physical mobility: people are constantly moving and they can find spare time to learn;
- Technology mobility: many mobile devices can be carried around as the learner is moving around, and they can be interchangeable, depending of the context and needs;
- Mobility in conceptual space: learning topics and themes compete for each learner. Themes should be created and changed according To the students' life experiences
- Social/interaction mobility: people learn at different levels and in a diversity of social groups like family, workplace, social events, at school;
- Temporal mobility: a learning process means that a large number of experiences will be connected between a large variety of experiences, temporal and informal.

Another attributes must also be considered to improve a good mobile learning experience [1]:

- Ubiquity: how widely available is the application that will be required for the viewer to see the content on the device display?
- Access: how widely available is the wireless network that will distribute the mobile learning content?
- Richness: do pages load quickly?
- Efficiency: How intensely the cliente will make use of a particular media?
- Flexibility: will the application be viewable on a variety of devices?
- Security: is the interactive mobile device protected from worms and viruses? Is the shared content protected from being intercepted by unintended recipients?
- Reliability: will content be displayed in a consistent manner;
- Interactivity: does the application allow users to interact freely with other learners?
- Collaboration: is it easy to collaborate on knowledge creation?

3   Application PALMA

The PALMA is a literacy tool created to develop ability to read, write, comprehend texts and solve elementary problems in the math and science fields for young and adult people through mobile devices and Web systems. An interdisciplinary team developed it: teachers, engineers, psychologists and developers of IES2 in São Paulo, Brazil. The application is based on synthetic approach using the Phonic and Alphabetical methodology (combining sounds and letters) for elaborating the content of the app.

The application content is splited into 5 levels, correlating time and complexity, from Vowels (level 1) to Reading Comprehension (level 5). Each levels is divided into five sub-levels. For this experiment only the level 1, Vowels, trough Nokia X5 device, was evaluated.

4   Methodology

4.1   Participants Profile

A qualitative approach was defined for evaluating the difficulties and easiness of application usage with emphasis in verifying the PALMA icons, voice guidance and the navigation flow. 10 participants were selected to participle of the evaluation, 9 female, 1 male, adults in literacy, with age between 23 and 59 years old. All of them Literacy Program for Youths and Adults students, a Brazilian Federal government's project.

The participants were indicated by their professors following the recommendation of being in basic level of learning, with instructions in Portuguese. When asked about the services they used most in their mobile devices, the participants commented the following answers: voice calls and contact list. When asked about how they used these services they showed the mental model through the access memorizing ways through their mobile devices' keys. They explained that they were instructed by their familiars about how to access these services. According to them these two services, voice calls and contact list are essential, because they allow to request help and notify familiars in urgency situations. During the beginning of evaluation the most part of participants did not know what the letters or signs on the keys meant, but they were sure about to access or find voice calls and contact list on their mobile phones.

4.2   The Study Description – Phase 1

The study was conducted in three phases: in a first moment, the participants received a visual guide (Fig.2) and oral instructions during the first contact with the app. An apart module of Palm app was used for the training, the level 'Avaliação Diagnostica' is used for training and measuring the level of knowledge of each participant through the tasks similar to the level 1, Vowels. After completing the training module each participant was instructed to press the navigator key and send the results of the evaluation to the online server. From this first moment, it was possible to observe the first contact and initial barriers of users, the level and speed of each one and the first points of improvements on user interface. Each participant received a Nokia X5, with prepaid SIM card of R$30,00 charge (local money) for using the PALM app during one month. For providing more confortable and familiarization to all the participants, the training was conducted in the same school where the participants perform their literacy classes.

In the end of the training, the next steps and proceedings were explained to the participants, and they were told they would be contacted via their phones, after 8 days of application usage to schedule the next meeting. They were asked to use and complete all the tasks related to the level 1, Vowels, according to their availability. They were instructed to call the researcher at anytime in case of doubts or questions. A printed card with a number to contact the researcher was delivered to each participant, professors and educators of the school.

Fig. 2. Visual guide used for the first contact with the PALMA application. Basic shapes in red were used to highlight the steps and sequence as a way to facilitate the user comprehension.

A group interview was conducted to verify the participants' first impressions.

4.3   The Study Description – Phase 2

In the second phase the participants were asked do an individual interview after 8 days of application usage. All interviews were conducted in non-controlled environment, according to the availability of each participant. All the participants preferred to be interviewed at home. Two participants preferred being interviewed in pairs. They commented that they felt uncomfortable to talk alone because some doubts could be described well by a friend or by a familiar who gave support to them during the usage. From this feedback, it was perceived how important is to provide training to familiars and friends which are asked frequently to solve problems related to devices and appliances at home, daily.

At each 5 days, voice calls were made as a way to help and clarify the participants' doubts.

4.4   The Study Description – Phase 3

In the third phase, a group interview at school, was conducted to verify the final perception, the comprehension of the PALMA features after one month of usage and others positives and negatives points. After finishing the evaluation, each participant received a gift card of $40.00 (local currency).

5   Results

At their first contact with the app, it was observed that the most part of the users tried to access the application over three times. They commented that the amount of steps is confusing. The unfamiliarity with the icons was one of the reasons responsible for that low performance. The participants searched for the researcher to solve doubts after 5 days of usage. According to them, they initially had doubts after the first day of usage but their friends and familiars helped them.

The participants showed interest for the innovation characteristics of mobile learning. On the other hand they commented that the app was very limited because it was available only in one specific model of Nokia device.

The navigation key was described by 1 participant as a barrier because sometimes is confusing to know when "go forward" or "go backward".

The size of the keys was highlighted by two participants as something uncomfortable. According to them, the number of keys could be reduced to make possible increase the size of the essential keys (without diacritical signs).

Some participants, after listening to the voice instructions were confused about which button or command should be selected to continue the task. About the volume, two participants commented that it was very confusing increasing the sound of Nokia Device. They sad it was very difficult to comprehend the voice instructions and consequently they had difficulty in completing the task.

After the first week of usage, 3 participants forgot how to access the application, during the trials they accidentally uninstalled the application. 5 participants completed all tasks after that period.

The most part of the participants completed all the tasks in 15 days. After that period they continued to use the application, they started all the tasks again. Upon returning the devices, all participants commented that they would like to continue studying through the app.

They really liked the app voice guide, all of them commented that it seems like the mobile device is really a friend. It was observed that this feature made the interface more human to their perception. They suggested that the voice could be customized, man voice for female students and woman voice for male students.

The number of steps to access the application was highlighted as confusing, mainly during the first week of usage. On the other hand, it was observed that at the end of evaluation, all the participants were familiarized with the steps to access. A suggestion to improvement the access, reducing the steps or creating a shortcut, was strongly recommended in the usability report.

It was possible to observe that teachers must be trained to advance teaching and learning through mobile technologies. All the professors commented that those applications offer opportunities to share content, to clarify doubts and mainly to personalize the content in a way to improve the pedagogy in their classroom. on the other hand, they got afraid before the possibility of having to solve problems in case something went wrong during use, because of their lack of technical knowledge.

6   Final Thoughts

All the participants felt confortable to explore others services/applications available in the devices after completing the tasks of the app. It was possible to evaluate the aspects defined during the initial planning. Thoughts about needs and accessibility were identified during the evaluation process.

Social and economic aspects, the lack of standards between devices and operating systems, the insufficient Internet infrastructure, the individual barriers to adopt a new technology are the main challenges for providing news ways of learning.

We must consider all the contexts and grades of education, high and middle school must have access to services like PALMA and similars. PALMA is an pioneer initiative in Brazil.

The initial training also must be provided for parents and friends, they have a very important role in all performance and usability testing. They also can contribute for implementing features and proposing improvements to the app.

Contextual evaluation has some risks about the use of equipment and devices. One mobile phone was stolen. The SIM card number and the device IMEI are essentials information for locking all the access.

Today in Brazil, a large number of people in the literacy process are over 50 years old. People over this age have to vision and hearing issues due to the natural aging process. These limitations must be considered during the development of interfaces for learning environments regardless the device, mobile or portable.

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