MOBILE LEARNING IN UNDERGRADUATE SCIENCE EDUCATION STUDENTS: UNDERSTANDING THE USES AND STRATEGIES

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ABSTRACT: This research has the general purpose of investigating the uses and strategies of undergraduate teacher trainees in Science, in relation to mobile learning. This research presents a qualitative approach. The population consists of undergraduate students in Science Education (Teacher Trainees in Science) of Federal Rural University of Pernambuco. Initially, the undergraduate students carried out a survey about their opinions and utilization of the mobile phone in their life, after that they had training and each student produced a didactic strategy on mobile phone use.

KEYWORDS: Mobile Learning, Didactic Strategies, Science Education

RESEARCH PURPOSE: Present research has the general purpose of investigating the uses and strategies of undergraduate teacher trainees in Science, in relation to mobile learning.

THEORETICAL FRAMEWORK

Mobile Learning is an increasing possibility for learning processes such as *anytime* and *anywhere* strategies and for formal and informal education. In contemporary education, students appear as protagonists of process, with focus on the *native* or *resident* digital. Traxler (2010, p. 10) presents that "mobile, personal, and wireless devices are now radically transforming societal notions of discourse and knowledge, and are responsible for news forms of art, employment, language, commerce, deprivation, and crime, as well as, learning". Pachler, Bachmair and Cook (2010, p. 5) define mobile learning as processes of coming to know and being able to operate successfully in, and across, new and ever changing contexts and learning spaces".

Sharples, Taylor and Vavoula (2010, p.1) describe that "children are developing new skills and literacies enabled by mobile devices, such as SMS texting, moblogging (write diaries and weblogs on mobile devices) and mobile video creator".

Research with the use of mobile devices presents a history of more than fifteen years in countries such as England, Canada and Australia. Since the arrival of the PDAs in schools, followed by notebooks, MP3 players and finally smartphones, mobile learning became the subject of study for many researchers in these countries. In Brazil, computation and administration areas, followed by researchers in education, developed the first projects.

The theoretical framework to discuss mobile learning has increased considerably in the last five years. From England, different approaches explore the area as the Mobile Learning Age (Sharples, Taylor and Vavoula, 2007) and the Conversational Framework (Laurillard, 2007). From Canada, two models are presented, firstly to use in the distance-learning programme, but that is very useful for the other activities: the Frame Model (Koole, 2011) and the Pedagogical Framework for M-learning (Park, 2011).

The Theory of Learning for the Mobile Age was developed by Mike Sharples, Josie Taylor (from the Open University) and Giasemi Vavoula (from Leicester University). The author focuses on the communicative interaction between learner and technology, exploring the dynamic process that exists in the system.

The first and central aspect of theory is the process of Conversation. The authors, based on the work of Gordon Pask, consider that conversation is the fundamental key to the process of learning. Pask (1976) explained conversation as the need to externalize understanding. Mike Sharples and Diana Laurillard introduced the element technology on the Pask's Conversation theory, where the conversational framework shows a conversation between learner and learner, learner and teacher or/and learner and technology. The second aspect is context as learning. Activities are developing in context as well as learning can create context through continual interaction.

Sharples, Taylor and Vavoula (2010, p. 4) characterized learning "as a process of coming to know through conversation and exploration across continually re-constructed contexts" and explained that Mobile learning "embraced both learning with portable technology, and also learning in a era characterized by mobility of people and knowledge". (p. 4).

Sharples, Taylor and Vavoula (2007) describe the insertion of computer and communications technology following the research of Engeström. The authors "analyze learning as a cultural-historical activity system, mediated by tools that both constrain and support the learners in their goals of transforming their knowledge skills."(p. 5).

The model describes a system of activity amongst subject (learner), focus of analysis, and object (material or problem at which the activity is directed). These are mediated by artefacts, including tools and signs. The authors adapted the Engeström Framework and introduced the layer Technology and Semiotic to show a dialectical relationship between both, and renamed the cultural factors as Control, Context and Communication. The semiotic layer describes a semiotic system in which the learner's object-oriented actions are mediated by cultural tools and signs. The technological layer describes an engagement with technology to communicate and to mediate agreements between learners.

In relation to Control, Context and Communication, it is necessary to explore some conceptions. The Control could rest with the teacher, distributed among the learners or between learners and technology. This possibility enables the learners to access materials when convenient and control the pace and style of interaction. The context is an important construction that can be explored from technological and semiotic perspectives. Regarding communication, the technological system provides different forms of communication for learners that adapt their communication and learning activities.

Diana Laurillard developed in 2002, the first Conversation Framework and in 2007 she introduced the mobile devices in the process. The new Conversational Framework can be used as a thermometer to test the insertion of mobile devices in the learning process. Laurillard (2007, p. 153) presents that mobile devices are changing "the nature of the physical relations between teachers, learners, and objects of learning".

The Framework defines the dialogic process between teacher and students on two interactive levels: (1) Discursive level: the focus in on theory, concepts and description building and (2) Experiential level: the focus is on practice, activity, procedure building. At the Discursive level, the teacher describes and decides what is to be framed. The students ask questions, the teacher elaborates, and the students state their own ideas or articulation of the concept. At the experiential level, the student is acting within a practical environment to achieve a goal and experiences the results of their actions as changes in that environment, enabling them to see how to improve their actions. In this situation, at the experiential level the students use the theoretical discussion to adapt their actions and at the discursive level, the students reflect on their experiences. Similarly, the teacher organizes a learning environment to attend to students' needs, and their explanation (discursive level) will benefit on their students' performance (experiential level). The process is the same for teacher and students, but it's possible to link with each other at the discursive level (Laurillard, 2002, 2007, 2012). The Park Framework was developed by Yeonjeong Park when she was a researcher for the Virginia Tech, USA. This model is appropriate to design training for distance learning, but in different perspectives with mobile devices it's possible to use this model. Park (2011) revisited different theories as Transactional Distance and the Active Theory. When she explained the Transactional Distance, three factors are presented: the programme's structure, the dialogue that the teacher and learners exchange in and the learners' autonomy. The Active Theory is explored when the researcher presents the mediation between teacher and learners, learners and learners, and teacher, learners and mobile devices (Engeströn, 1999). The research describes that it is essential to think about the use of portable devices and contexts when designing mobile learning. Finally, Marguerite Koole developed The Framework for the Rational Analysis of Mobile Education (FRAME). Three aspects are considered in her research: mobile technologies, human learning capacities and social interaction (Koole, 2009). The research explains about the importance of her theory to develop mobile devices in the future, to design didactic strategies for teaching and learning and to create learning materials. For Koole (2009), the FRAME Model describes the possibility for learners to move in different situations, virtual and physical, to interact with other people, information or systems as well, anywhere, anytime. Device, learner and social comprehend the principal aspects of the Model.

METHODOLOGY

This research utilizes different methods with a qualitative approach. This research was developed with undergraduate students in Science Education (Teacher Trainees in Science) at the Federal Rural University of Pernambuco. Two different classes of trainee teachers participated in the research, with 30 students in each class, that were at that time undertaking teaching practice in different schools in Pernambuco.

Before the training started, the undergraduate carried out a survey. After completion of the survey, when the students had been training, they produced a didactic strategy with the following plan: (1) Year and Discipline where strategy will be used, (2) How the mobile phone is used both inside and outside of the classroom, (3) Name of activity, (4) Social profile of students in relation to the use of mobile phones for development activity, (5) Describe the features of the phone that will be used to perform the activity, (6) Rules of activity, (7) Describe the implementation and methodology of the activity, (8) Describe how you will provide the activity process evaluation.

The training presented the context, the experience and the methodology for the implementation of the project in Mobile Learning. The available technologies and opportunities that mobility brings for the construction of a new model of education includes: ubiquity, group working and pervasiveness. The objectives of training were: (1) to discuss the relationship with technologies in teacher training,

(2) to know and evaluate the applications of mobile learning in the learn-knowledge process, (3) create planning for the utilization of mobile learning, from the formulation of their objectives, the choice of contents and methods and techniques for achieving the objectives through to the elaboration of instruments of evaluation and level of satisfaction of the students and (4) create conditions so teachers can develop learning objects from mobile learning.

DISCUSSION

The strategies developed by the teachers in formation present indicators that refer us to the first research on the use of information and communication technologies in the classroom. Many timidly present the capabilities of mobile devices in the activities to be developed, and once again as it was at the beginning of technology entry into school, strategies bring these resources only to compose a process, being totally contemptible their presence or not.

Another issue worth mentioning is the insertion of more than one resource of cell phones and smartphones in the activities to be developed. Generally, resources are used merely to reproduce content, without establishing an association between the resource and the possibilities that it could promote in the strategy. Most of the time, the activity could be performed totally without the device.

Teachers in training had enormous affinities with the use of mobile devices, especially mobile phones and smartphones. The data revealed that the process of insertion of these resources into the individuals' personal lives, as well as in the development of the studies, was already a reality.

It is notorious that we have teachers in training with new methodologies both in the proposition to learn, and to manage their day to day with information and communication technologies. When we do an analysis of the didactic strategies elaborated by the teachers of sciences in formation with the raised profile in relation to the use of mobile devices, some findings are relevant. The resources used in cell phones and smartphones, mostly in their personal lives, are identified with great frequency in the elaborated strategies. Research carried out by large companies indicates that the use of cameras, both for recording photos and recording videos are the resources most used by the general population.

CONCLUSIONS

This research attempts to understand how contemporary undergraduate students can utilize mobile phones in their future classes. Presently, students are using many functions of the mobile phone in their daily lives. However, the principal question is, how these users will plan their classes with the mobile phone. With the continuing research, we hope to comprehend the use of the mobile phone for future teacher training in Science Education. Mobility and its incorporation in culture and society bring new perspectives and challenges for education. The rapid growth of applications and the use of mobile devices such as tablets and smartphones, present a lot of possibilities for the sharing and production of content in a format that explores new forms of learning. This reseach can contribute with both initial and continual progression of teachers in Science Education and a review about the theoretical framework.

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