WALKING TOWARDS INSTRUMENTAL APPROPRIATION OF MOBILE DEVICES. A COMPARISON OF STUDIES

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ABSTRACT

The study of instrumental appropriation is considered a relevant outstanding and productive perspective in the arena of Mobile ICT and learning. This paper seeks for the consolidation of this perspective at a theoretical and analytical level. Regarding the theoretical level, two characteristics of mobile devices –flexibility and mobility- are explored in order to make explicit the relevance of the instrumental appropriation. Also, the division of the instrumental appropriation into two levels (external and cognitive) is discussed. Regarding the analytical level, a comparison of European studies are presented, in order to analyze what is the level of application of the 'appropriation perspective' that may be found in the pre-existent studies. Results from this comparison revealed that the consideration of this perspective was limited and unspecific. For a better understanding about the educational impact of the instrumental appropriation more research is needed, specifically regarding the division of the appropriation into the practical level and the human cognitive level

KEYWORDS

Mobile device, instrumental appropriation, educational impact

1. INTRODUCTION: HOW MOBILE DEVICES MAKE EXPLICIT THE RELEVANCE OF INSTRUMENTAL APPROPRIATION IN EDUCATIONAL SETTINGS?

The high mobile technologies penetration worldwide confronts us to an overview around the great impact that the mobile ICT has produce in our contemporary society. Growing studies are analyzing the mobile market share, the mobile advertisement, or the revolution of the mobile applications, among the most relevant (MobiThinking, 2012; Infographic, 2012). However, the mere study of the penetration does not provide enough aid to envisage all their effects, especially at the most profound changes. We are increasingly using the mobile devices for a great number of activities, with a variety of purposes that are changing the way we are used to do the more simple things: reading a newspaper, paying the parking, buying a flight, etc. with strong effects in our instrumental routines. Thus, we need a new perspective for understanding the impact of the uses, because as Bar, Pisani and Weber (2007) pointed out the innovative and long-term effects only happen when users have appropriated the technology, this is, when users has successful and meaningfully integrated it into their activities.

The study of appropriation of instruments, or instrumental appropriation (Wertsch, 1998; Belin, Prie, 2012), is significant for all kinds of technologies; however, we consider this process is particularly outstanding and productive in the arena of Mobile ICT, because of two reasons related to the customization flexibility and the mobility.

First, mobile devices allow personalization both in hardware and software; an example is the digital tablets, which are instruments without predetermined utility. So much so that when the first iPad was born, everyone was asking: ¨what is this? What can I use for? ¨ Appropriation is fundamental in the determination of uses. The own users in their practices create the new technology uses (Salovaraa et al, 2011). Precisely, this context of practice cannot be separated of the understanding of the uses; there is not a main use, the uses

depend primarily on the needs and preferences of users. Also, in this appropriation of uses, any software can be prioritized; thus, the mobile device can be turned into a table painting, a musical instrument, and so on.

And second, the other feature that enables users to make the appropriation is the mobility. The use of instruments is strongly influenced by the context. The same technology or software may have unexpectedly diverse effects, according to specific setting (Tolmie, 2000; Dourish, 2004). The mobility of these devices implies a type of insertion in almost all contexts, and users frequently assign new utility towards the same device (e.g. people often turn on the mobile phone in dark sites and use it like a flashlight).

These two reasons make explicit the relevance of the instrumental appropriation theory, in order to analyze the uses of Mobile technologies. Due to their significance and in order to move this theory forwards to the educational context in this paper we examining, first, what are the main implications for the pedagogical understanding of the mobile devices; then, we present a part of a meta-analysis carried out among the studies of m-learning, in the context of Europe, which aims to identify in what level the instrumental appropriation perspective is considered from the first studies up to now.

2. INSTRUMENTAL APPROPRIATION: A KEY PERSPECTIVE FOR UNDERSTANDING THE EDUCATIONAL USE OF MOBILE DEVICES

Nowadays mobile devices are increasingly integrating in the educational settings. Learning practices using mobile devices, as smartphone and digital tablet, are growing. However, these innovative experiences are still far from being universal. There are few studies on how these technologies are appropriated as educational tools. The scarcity of studies is due to the difficulty in investigating the different uses of these mobile devices, which are generated in a particular context of activity, and many times are evolving according to the development of activities. Even, sometimes, the uses can be made unconsciously and, therefore, the user does not get to identify the usage or utility.

In our study the instrumental appropriation is highly considered, because when a new tool comes into interaction with other elements in educational activities, a number of impacts are produced; from the minimal changes to the more profound, or modifiers of the initial schemata of how, when and where to doing teaching and learning. Specifically, the instrumental appropriation perspective allows us to study the educational impact of Mobile ICT focusing on its influence in two aspects: the change in the educational activities and the cognitive change in the subject, either teacher or student.

Besides, it is important to consider that 'the appropriation' is a term widely used in different areas, such as computer science, sociology and education. Computer Scientists like Carroll and his colleagues (2002) consider that the appropriation is a process of the adoption, the adaption and the integration of tool into activities. For those educators like Vygotski and Wertsch (1999), the appropriation is the mechanism of learning, by which the human culture becomes part of the individual psychology. We need to keep in mind that these two visions are not opposed, but compliment; the instrumental appropriation happens at two levels. The first appropriation is the external level or the practice level, that is to say: the adoption, the adaption and the integration of tools into activities. When a new tool is integrated into an activity, the user attempts to dominate and modify this instrument to adapt his needs and preferences. During this process the tool may change, develop and complete in its nature and utility. In this sense the instrumental appropriation is the process of modification and adaptation of the tool in order to be suitable for certain user activities.

The second appropriation occurs at the cognitive level, where take place the acquisition and the construction of new meanings. According to Dourish (2003) and Salovaraa (2008), cultural tools like mobile devices are, themselves, system of meanings. They can be seen as materialization of designer´s knowledge and intentions. Therefore, before and during their use, the mobile devices users need to interpret and understand the properties and functions of the tool. It should be noted that the users do not play a passive role in the process of appropriation. In fact, users can assign new utility to the tool, usually in a way beyond the designer purposes. Moreover, the construction of new meaning is more than an individual process. Haddon (2001) indicates that, after adopting of the technologies in our lives, the discussion, the negotiation and the argumentation still take place with another people about how to use such technology in practice.

This compliment perspective will help us to gain an in-depth and complete understanding about what is happening in the innovative learning practices using mobile ICT. Under this framework, assuming that we are in an early stage of the introduction of mobile ICT in education, the studies up to now are very creative.

In our study we carried out a meta-analysis of the existing studies on applying mobile devices and learning, seeking whether 'appropriation' perspective was considered. In the first stage of our analysis we found that there is a great deal of learning approaches, such as situated, augmented and collaborative among the most cited. However, there are less studies reporting on how appropriation (in the two levels mentioned above) can be best applied in the educational agenda.

In the next section we compare data from three European projects in which we studied the attempts to include the 'appropriation' perspective. This analysis was guided by two key questions:

1. What are the main pedagogical approaches that can give explanation for the use of mobile devices in educational settings?

2. What is the level of application of the 'appropriation perspective' that may be found in the pre-existent studies?

3. INSTRUMENTAL APPROPRIATION: A KEY PERSPECTIVE FOR UNDERSTANDING THE EDUCATIONAL USE OF MOBILE DEVICES

Widespread research on the educational use of mobile devices started from the mid 1990s up to now as a result of a growing understanding of the learning affordances (Pachler et al, 2010). Different kinds of studies and macro-projects have enabled the investigation of mobile learning experiences across several contexts. Data from our research revealed that Europe is one of the areas where more research has been done on this topic. Thus, in this paper we present the results from a comparison of three of the most relevant European projects, including MOBILEARN[1], EMAPPS[2] and M-learning[3] (West, 2012).

In this meta-analysis framed in the European context we considered nine categories: timing, promoting institution, educational modality (according to Coombs, 1985; Coffield, 2000; Schugurensky, 2000; Cross, 2006), target group, goal of the project, specific objectives, the pedagogical approach (as defined by the project), methodology and results. Table 1 summarizes the comparison in between the three projects.

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[1] http://www.mobilearn.org/

[2] http://emapps.info/eng

[3] http://www.m-learning.org

Table 1. Comparison of studies on Mobile Learning

	M-LEARING	MOBILEARN	EMAPPS
Timing	2001-2004	2002-2005	2005-2008
Institution	Learning and Skills Network (LSN)	European Commission	European Commission
Educational modality	Non-formal learning	Non-formal and informal learning	Game based learning, informal learning
Target group	Disadvantaged young adult	Mobile workers and learning citizens	Children
Main goal	Help young people between 16-24 years who had no success in the educational system and were considered at risk of exclusion in society, involving them in non-formal learning	Exploring new ways to exploit mobile environments and technologies in order to supply to users a richer, more exciting and satisfactory learning experiences while freely on the move.	Exploring the impact of the educational games on the children learning in the school context.
Specific objectives	Creation of technological system for supporting mobile learning. Development of educational content for mobile learning. Studying the impact of mobile devices to include disadvantaged young people in learning.	Creation of pedagogical paradigms to support learning in a mobile environment. New architectural layouts to support creation, brokerage, delivery and tracking of learning and information contents on the mobile network, which extend existing systems. Selection, adaptation, or creation of existing e-learning contents for mobile devices. Realization of new business models.	Creation both the communities of children and the communities of teachers. Development of educational games on mobile platforms. Creation of a child living map of Europe. Design and implement effective training and multiplier mechanisms for future exploitation.
Pedagogical approach	As both the concept and the practice of m-learning are still very new, the research largely focuses on the exploration of information gathered and further development of hypotheses, rather than on providing pre-existing theories.	Ambient-learning: the development of innovative models for the provision of learning services, fully exploiting the potential of ambient intelligence technologies, enabling ubiquitous, interactive, personalized and tailored access to learning and knowledge on demand to individuals at home, at work or on the move.	The theory of social constructivism Game-base learning
Methodology	The project has developed prototype products and innovative approaches designed to support learning – particularly literacy, numeracy and and survival/life skills – using handheld devices such as mobile phones and palmtop computers or pocket computers	The MOBIlearn research has been, in fact, driven by ¨learning pull¨ rather than ¨technology push¨, paying extreme attention to research into the pedagogic aspects of e-learning, trying to define learning paradigms for ubiquitous applications, with new organizational, business and learning models taking into account socio-economic, competency, cultural and motivational factors	The project has envolved significant effort in terms both of technical development and experimentation in real-world school environments.
Results	As part of a blended learning, mobile learning has the potential to help young people to improve both their skills and their self-confidence. Creation of m-learning infrastructure: LMS and mPortal	Task model for mobile learning. The MOBIlearn system. Pedagogical contents for mobile learning. Market analysis and business modeling.	Development of Mobile games. Revelation of the educational value of Mobile games. Creation of system of game-based learning.

These three projects reflect the development of m-learning research, particularly in the search for a suitable pedagogical theory for this new learning paradigm. Regarding the first, when the M-learning project began, there is little knowledge about the topic. Therefore, the research focused on a collection of data on technological characteristics, user preferences and needs of mobile learning. In this study the process of instrumental appropriation, in this case regarding young adults, was limited although based on the external level, the adoption of mobile devices and the effects on preferences of use. Results regarding the 'self-confidence augmentation' in these users cannot be translated as the effect of appropriation at the second level, or cognitive level; however, it started to glimpse a micro-level in the effects of using mobile devices. More data is needed to corroborate this assumption.

To fill this gap, the MOBIlearn project attempts to define and explain a new learning paradigm. This project made the first efforts to understand the instrumental appropriation. Then, the third project, instead of creating a new theory to understand the m-learning, it aims to measure the impact of technology on the application of existing learning theories (game based learning and collaborative learning).

MOBIlearn project gets to create a mobile learning model, indicating six interrelated factors in this activity: subject, technological tool, control, context and communication. The task model provides a coherent account of how the activities are performed, the people are involved, their contexts, the tools and technologies they employ, the structure of the tasks and an account of their cognitive processes, management of knowledge, and social interactions. The main purpose of the task model was *to describe the interactions between the people and their tools and resources, and to analyze how people externalize their work, through representations of culture product such as notes and diagrams, the rules and conventions that influence the activity, etc*. (Bo, 2001).

It is considered that a dialectical relationship between the six factors exists. In the framework of the 'appropriation', for understanding how people adopt, adapt and use technology, it is necessary to study these relationships. Besides, the research indicates that the mobile learning activity takes place both on the technological space and the semiotic space; and this model can be applied in two levels. Thus, through indicating the importance of interactions between subject and a new tool, together with the existence of two spaces of m-learning activities, this research makes the first step to understand the new learning paradigm from the perspective of instrumental appropriation.

Moreover, this model was created for the design of technological system for m-learning. Therefore, it is divided into two levels: the technological and the semiotic. However, the model has only indicated some factors from the whole range of factors needed to consider the study mobile learning activity, and without explaining the mechanism of instrument appropriation. All this considerations suggest that more studies in reveling the details about this process are needed.

4. CONCLUSION

Mobile devices are instruments that not only affect the mental activities but also influence other human practices. In the context of the activity with the specific user and the specific device are being produced changes in the activities systems, one of the most relevant: the way to carry out the teaching and learning. Therefore, the mobile devices appropriation presupposes an interesting interpretation of the educational activities and the individual cognition.

In our study we found that the application of this perspective was limited and unspecific. However, for a better understanding about the instrumental appropriation and its educational impact, the most suitable way will be the division of the process of instrumental appropriation at the practical level and at the human cognitive level. Considering that there is no fixed model of how to use these technologies in the classroom, an in-depth research on the incipient experiences about the application of the instrumental appropriation, and the division proposed in this paper, is needed. We can start for analyzing those innovative teachers that have to invent the way to integrate mobile technologies in their activities. The focus on the instrumental appropriation by these 'lonely rangers' (Bates, 2001) will help us to understand these new experiences, especially to identify the key factors that affect this educational process.

From our investigation we propose some suggestion for future research on mobile technology use in education:

- Initiating studies for observing educational activities assisted by mobile technology in the real scholar context. It allows researchers to explore the mobile technologies appropriation that occur in formal educational activities; especially to identify how different factors of the formal activities affect the appropriation process.

- New research that focus on the relation of the two levels of appropriation will be useful for identify changes that occur in the activity system; it is important to study what happen in the cognitive level and how does it happen for establish then how must be happen, what can be the most effective way to learning and teaching with mobile technologies.

- To study both the teachers and the students' appropriation experience is noteworthy, especially for the identification of the strategies and the mechanism their use for achieve the appropriation of the tool as an educational tool.

- The appropriation is a process not only of starting but also a long-life process, thus the interactions among teacher-student and student-student are vital to consider how the appropriation is evolving, stopping, increasing… Research about the continuum in between adoption, appropriation, and practice activity will be also relevant.

- The comparative perspective will be also welcome; it will be relevant to carry out studies comparing appropriation that happen in the school context and that happen at the informal context. #

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