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From E-learning to Mobile Learning: New Opportunities

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Abstract

This chapter focuses on an experience of blended learning that is still ongoing for the training of managers of Technological Transfer (TT), who work in an Italian Scientific Technological Park (STP). Their main activity is linked to technological transfer. In the STP the technological transfer manager is the key figure in the management of the transmission of scientific knowledge from the research world to the industrial dimension. The aim of this project is to conduct an experiment in a "Training course for the TT manager" in order to satisfy their training needs. The course is based on a blended learning model, with the use of combined traditional educational methodologies: (1) e-learning methodologies and face to face and (2) m-learning methodologies and face to face. This chapter will focus on the blended m-learning experience.

Introduction

This chapter focuses on the ongoing experience of blended learning (e-learning and m-learning) for the training of managers of Technological Transfer (TT), who work in an Italian Scientific Technological Park (STP).

With the term mobile learning we refer to a modality of distribution of any learning content with portable devices such as the Personal Digital Assistant (PDA), Tablet PC, e-book, and mobile phones. More generally, it is possible to call mobile learning any form of learning through devices which are very small, autonomous from the electrical supply, and small enough to accompany people anytime and anywhere (Roschelle 2003; Trifonova and Ronchetti 2003; Liang et al. 2005).

Since 2000, literature on mobile learning has been increasing more and more every day. Many researchers from all parts of the world have been researching and are still working on this new learning methodology. Mobile learning is different from e-learning, since it is not just electronic, it is mobile (Shepherd 2001). Mobile learning is seen as the natural evolution of e-learning, according to Hoppe, Joner, Millard, and Sharples (2003), "m-learning is e-learning using a mobile device and wireless transmission." In Harris's (2001) opinion, "m-learning is the point at which mobile computing and e-learning intersect to produce an anytime, anywhere learning experience."

With mobile learning the learning phase is not bound to a location with specific characteristics, potentially becoming omnipresent learning. For example, delays during commuting and travelling on the underground become potential learning moments. In general, any moment which would otherwise be "wasted," or that before now could not be enriched with didactic contents, has now become a potential learning moment thanks to mobile learning.

The main activity of the STP is linked to technological transfer. STP is a structure where companies can find valid support in terms of space, technologies, and financing. STP is a privileged access channel for innovation and applied research, thanks to a system of integrated services available for companies situated inside the park, and also for those in the entire surrounding territory. Until 1995 there were only three STPs in Italy; at present there are thirty-three.

In the STP the technological transfer manager is the key figure for the management of the transmission of scientific knowledge from the research world to the industrial dimension. The TT manager has various levels of competencies and is able to talk to the research world as well as to industry. The TT manager has the task of turning the functions/objectives of the

research world towards the demands of industry and of government and also of simplifying the knowledge transfer from the research world to the business one (Diamantini 2004).

The dynamics of innovation, even if they are very important for the national socio-economic system, are a circumscribed phenomenon (Lundvall 1992; Patel and Pavitt 1994). Because of the limited number of interested subjects and of the necessary high profile of excellence and of the enormous quantity of competences involved, these training processes are for the training of a highly specialized elite.

From the training of TT managers, various difficulties emerge when designing models for specific training situations. A first difficulty is tied to the formalization level of the highly specialized expertise, which constitutes the central nucleus of the competencies on which the activity of the TT manager is based. Some of these competencies can be based on knowledge linked to a concrete know-how, others on an abstract and theoretical knowledge. However, it is clear that knowledge which is based on strictly academic educational processes, characterized by a high level of abstraction, translates into highly specialized training models which is often far away from the concept of problem solving. Instead, in the everyday scene the TT manager has to solve concrete problems, where not only academic-theoretical knowledge is required, but also practical knowledge. Therefore, the knowledge that TT managers need for their work must be composed of a complex mix of theoretical competencies acquired from study and a set of practical competencies, along with experience and know-how accumulated in a professional ambit.

In Italy there are various initiatives for the training of the TT manager, from universities and other public agencies not referable to the academic institution in a strict sense. These projects, even though they are relevant in the Italian framework, do not satisfy the training demand of TT managers. First of all, the training model used in these experiences is still the traditional face-to-face lesson, and possesses an extremely abstract character. Secondly, there is the problem of time. Typically, the TT manager does not have long periods of time to spend on training during the work day.

The Blended Learning Course

After an analysis of the complex situation illustrated in the previous paragraphs, it was decided to conduct an experiment for the "training course for the manager of technological transfer" in order to satisfy the training needs of the TT manager. This experience, which began in January 2005, is still ongoing.

In the Italian framework, the methodologies that were used are the novelty of the course. The course is based on the blended learning model. Blended learning is a combination of different approaches and strategies to teaching with the objective of making learning more effective and personalized. In this view future training programs are oriented towards an integration of different educational methods and creating equilibrium between the traditional face to face classroom and distance learning. This trend is in a prospective of lifelong learning and also brings the valorisation of individual knowledge, not only formal but also informal knowledge.

In this training the following educational methodologies were used:

- e-learning methodologies and face to face
- m-learning methodologies and face to face

It was decided to use the blended learning methodologies since it is believed that both e-learning and m-learning present a series of pros and cons, as in all new applications. Therefore, the forms of blended learning are able to take advantage of the benefits of the technological innovation without having to sacrifice the strong points of the more traditional and consolidated modalities of a classroom setting.

The Sample

The sample was chosen according to two main criteria, the subject of the sample must:

1. Have a role and organizational function relative and coherent with the objectives of the course.
2. Show a real need for the training.
3. Be motivated to participate in the training, as a fundamental component for a positive outcome.

To reach the first two objectives it was necessary to choose high level employees and not office clerks.

The sample is made up of fifteen people, five men and ten women, between twenty-nine and forty-three years old (average age = 39.7). These people who not only have a university degree, in some cases (six) have a master's degree and in other cases (two) are working on their doctoral degrees.

Blended E-learning Experimentation

The experimentation of the blended e-learning model was made on four levels:

1. Needs analysis. In this step the company indicates the organizational and individual shortages. The analysis of needs is supported by

competency models which indicate learning and competencies to be developed, through subsequent educational processes.
2. Design of the interventions. Educational interventions are designed after the training objectives, which are intended to be followed and the modality of transmitting the competencies of the models that have been selected.
3. Delivery of the training. Education processes are delivered, and they are structured in further evolving cycles that make the creation of new learning effective.
4. Assessments. In this conclusive phase new elements which are produced and interiorized are integrated. They become part of the organization which codifies and assimilates them by making them part of the common patrimony shared by its members.

The experience of blended e-learning will not be described here in detail, but this chapter will focus on the results of the assessment phase, since these results were the starting point for the design of a blended m-learning experience.

Critical Factors That Emerged in the Course of the Blended E-learning Experimentation

There were three instruments used to analyze the results obtained from the blended e-learning experimentation. There was the double objective of understanding the qualities and characteristics of the sampling and the positive and negative aspects of the course:

1. A questionnaire about the correlated competences for a personal development plan (PDP), in which the objective was to show aptitudes and competency of the students.
2. Assessment forms of the learning modules taken, used to identify the strong and weak points of the modules.
3. In depth interviews of the students to integrate with the questionnaires in order to finish the profiles.

The assessment shows that on one hand, the students judged the contents positively; on the other hand, there is a limit created by the mental representation of a desktop computer, which is seen only and exclusively as a work instrument and not as a lifelong learning instrument.

The students had difficulty becoming familiar with the computer instrument as a training and communication instrument and not only as a work instrument. The first level of analysis is to represent the work instrument; all students work on a personal computer, but none of the students had

taken an online course. Therefore, representing the work instrument as a training instrument requires the structuring of an appositive learning path. For example, a pre-course would be useful to help the student become familiar with the instrument. According to the students an entry test would be useful, as a means to understand how the learning instrument could be effectively used.

Furthermore, as was shown by the tracking of the platform accesses, almost all the students came on the platform during the work day at precise times. This lets us understand how the computer instrument is not viewed as a training instrument and how the training is not perceived as a continuative process, but is still seen as a moment in itself that must not go beyond precise times during the day.

The Blended Mobile Learning Course

It is thought that m-learning can make up for the critical factors that characterized the blended e-learning experience. In the blended m-learning we decided to:

1. Administer a pre-questionnaire in order to understand how the learning instrument could be best used.
2. Familiarize the students with the instrument through a first face to face meeting of the course where the Pocket PC is presented and distributed to the students; the fruition of a learning unit on mobile learning and a second face to face meeting to share doubts about the new learning typology.

In particular, it is thought that the mental representation of a mobile device is different from a desktop computer for the following multiple reasons:

1. The versatility and the wide use of the mobile device for teaching, a palmtop for example, easily becomes a multimedia screen for listening to music, looking at pictures, and viewing films.
2. As suggested by Graham (1997), Steinberger (2002) and Figg and Burston (2002), it is so easy to learn how to use a mobile device that normally an instruction booklet is not even necessary. In less than half an hour a new user is able to become familiar with the main functions of a new device and to acquire familiarity with its software in order to autonomously attend a course. This is due to the fact that most of the users are using similar devices everyday, such as mobile phones. This consideration is not true for a personal computer where the lack of knowledge of the computer environment requires training sessions for at least one day for someone who does not have familiarity

with a computer. It may require more time for the use of application software.
3. The mobile device, different from the desktop computer, which for many people is bound to the work and the office environment, now accompanies the majority of Italians practically all the time and everywhere.

The experience of blended mobile learning can be divided into the following phases:

1. Face to face meeting with the students, during which a pre-questionnaire is administered and the Pocket PC is presented and distributed to the students.
2. Completion of a learning unit on mobile learning.
3. Face to face meeting with the students to discuss the new learning methodology.
4. Completion of the didactic module on one of the topics taken from the needs analysis made in Phase 1.
5. Face to face meeting with the students for the discussion of their observations and the administration of the assessment questionnaire about the experience.

As previously reported, the experience is still ongoing. After having explained the model and the teaching strategies used, a brief explanation will be made of the didactic modules, the pre-questionnaire, and the assessment questionnaire.

The Model and Didactics Strategies

The transformations in the current didactics used for mobile learning are mainly linked to the fact that the learning activity takes place through a new tool – the mobile device. And, just as online didactics differ from face to face didactics, didactics via mobile devices must also take into consideration some elements that differ from face to face and online didactics.

Obviously, these elements are not linked exclusively to the mobile device in itself, but to the peculiarities of mobile learning: the time gaps and places of its use. Just as online didactics cannot be a simple transposition of personal didactics in the most traditional sense, the same is also true for didactics via mobile learning – it cannot be a mere transposition of online didactics.

We decided to structure the course using learning object approach. From the tests and studies carried out so far, it seems that the mobile devices are very flexible technologies which can support various models, from those

based on the transmission of contents to those based on interaction, experience, and the building up of knowledge.

Starting with these considerations, in each Mobile Learning Object (MLO) we decided to let the transmission of contents be followed by a topic for reflection or by homework, the results of which were shared during the next face to face meeting.

To create this didactic unit, the guidelines of Steinberger (2002) and Figg and Burston (2002) have been taken into consideration. According to them (as quoted by Trifonova and Ronchetti 2003):

> Modules should be short, and last no longer than five to ten minutes. Users should be able to use small fragments of time spent waiting or free time for learning, by reading small pieces of data, doing quizzes or using forums or chats. Simple, fun and added value functionality. The computational power and other properties of mobile devices make it difficult in most cases to use complex or multimedia content, although devices of the same size are used for entertainment with great commercial success. It should be possible to use an m-learning system without reading a user manual, and the experience of studying with the help of such devices should be interesting and engaging.

When introducing the contents to promote learning, we followed the guidelines by Mayer (1999) who suggests:

- Underline the most significant information using titles, italics, bold, underlining, font sizes, icons and images.
- Explain the didactic goals in order to orient the participant's attention towards the main contents
- supply short summaries.
- Take out redundant information and adopted a concise style in order to reduce "noise."

To make it easier for the student to organize and process the new information, and help the student to connect the selected representations in order to create a coherent mental representation, we have tried to:

- Structure the text in a clear and comprehensible way; in particular we have explained the conceptual relations among its parts (cause/effect, confrontation/comparison, classification, and so on).
- Supply an "outline" of the key points.
- Indicate the key words.
- Supply graphic representations to correlate the new concepts (i.e. schemes).

The Pre-questionnaire

The pre-questionnaire was created by selecting thematic areas from a survey made on scientific literature regarding mobile devices in general, and mobile learning in particular. It is divided into four parts.

In the first part, several free associations are requested (maximum five) for four stimuli: mobile telephones, desktop, notebook, and handheld computer. In the second part, participants are asked to give their opinion about the associations they gave: positive (+), neutral (0), or negative (–) ratings.

In the third part, they had to answer questions about their own mobile devices and their use.

In the last part, social-personal questions were asked, such as sex, age, residence, education, profession, average time spent to reach their place of work, and their use of Internet.

The goal of this questionnaire is to understand how the learning instrument can be used, something which was not done in the blended e-learning experience. For this, it is necessary to understand what mobile devices our subjects have, how they use them and how they are willing to use them.

The Didactic Modules

The didactic modules, in text format and audio, constitute the learning objects which last approximately ten minutes each. Every MLO has a contents part followed by tasks to do (for example: "Try to reflect on one of the topics that was just presented to you," or "Collect material on one of the topics which was just presented"). The results of the reflections and the tasks will be shared with the participants of the course in successive face to face meetings which will lead to the co-construction of common knowledge.

The Assessment Questionnaire

The areas to be investigated in the assessment of the quality of the mobile learning experimentation have been identified also in the literature about mobile learning. In particular we have considered:

- The benefits of mobile learning, such as the chance to access the training contents anywhere and anytime.
- The features of the mobile device in itself, in this case the Pocket PC, both in terms of hardware and software.
- The way the user feels the mobile device is as a learning tool.
- The structuring of the course both in terms of content organization, the stimuli and the homework assignments proposed.

The results obtained from the analysis of the data from the various areas had the objective of identifying the areas of the training process where action should be taken in order to improve the participants' satisfaction of the training processes.

Regarding the features of the mobile devices in themselves, if subjects have never used a PDA before, they were asked if they had any problem using the Pocket PC. They were also asked to assess the following aspects using a five-point Likert scale:

- readability of the contents on the screen
- use of the pen
- surfing and menu changing
- screen colours
- battery life
- audio

As for the characteristics of use, the space and time gaps in which the mobile device was used for the didactic unit have been investigated. Students were also asked if using the Pocket PC in public has been easy and accessible, or if it has been difficult. If some difficulty was experienced, the student had to specify if it was caused by lack of concentration, reception, reading of the screen, or by some other factor.

With regards to the course content and organization, after a question about the general assessment of the course, the students were asked to assess the proposed topic and its relationship to their training path with another five-point Likert scale. The students were asked to assess the stimuli and the homework assignments proposed at the end of each single MLO, and they also have a final meeting with the trainer.

Finally, they had to indicate the three positive and the three negative points of the module and also the main problems they had found, making suggestions regarding the development of the module offered to them.

Implications for Practice

To obtain good results from the course it is important to have a first face to face meeting with the students in order to familiarize them with the mobile device, where they are loaned the Pocket PC and trained in its use.

From the evaluation questionnaire it was seen that the subjects were afraid of losing the pen or having the Pocket PC stolen. At the final meeting it was seen that the emphasis they put on the fear of theft or loss was tied to the fact that the Pocket PC was not theirs. In light of these elements, it was thought that it would be useful to promote the purchase of the mobile

device by the company/subject so that it would become 100 per cent part of the subject's daily life for work and after work. It is important that the mobile device is seen from the start not as an instrument limited to a temporary experience, but as a permanent instrument of life-long learning.

Conclusion

From this experience of blended m-learning still in progress, it seems that blended m-learning training method suits the needs of TT managers better than blended e-learning. Mobile learning allows trainees to use time and spaces formerly "lost" from training activities (for example, the time spent on the bus from the city to the STP) by blending it with e-learning.

Among the positive elements of this experience, subjects mentioned the ease of use of the mobile device, its usefulness to fill up empty moments like traveling on the train, and the fact that taking a course via a mobile device was engaging and fun. This last point is a further confirmation of what has emerged from other numerous international experiences: Learning with a mobile device is enjoyable for students (Prensky 2001; Seppälä and Alamäki 2003; Savill-Smith and Kent 2003; Schwabe and Göth 2005).

The work with blended m-learning also shows that there is the need to develop teaching strategies that focus on those experiential elements which can strengthen learning by building what in contemporary literature is called "learning experience."

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