Campus We-Com. University students' attitude towards didactical innovation

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Abstract

The Campus We-Com (Wireless Educational Communities) project was carried out at Campus Bio-Medico University in 2007 and proved the usefulness of wireless networks in University environment to enhance students' learning and to support teachers' work. The ubiquitous availability of wireless network coverage has encouraged communication and information exchange, thus enabling the creation of communities of practice, composed by students, residents and tutors.

We asked students to fill in a questionnaire before and after the project, in order to evaluate their attitude towards technology. The data gathered were useful to create different paths for the different courses, fixing goals and strategies to achieve them with teachers and tutors.

Besides the theme of wireless networks in University, during the project we investigated on various areas of technological and didactical interest: LMS (Learning Management System) to support teaching, students' attitude towards innovation, teachers' training to the use of technology, teachers' strategies for the best use of technology.

From the project outcomes we elaborated some guide-lines for future projects, which could be useful for the replication of the project in different universities.

1 Introduction

Between October 2006 and August 2007 Campus Bio-Medico University of Rome carried out a project called Campus WeCom (Wireless Educational Communities). The project was supported by the Italian Ministry of University and Research, with the purpose of enhancing the use of wireless technologies for didactic activities, making it easier for students to access university databases and multimedia information. The operative part of the project was carried out by two Departments: the Area of Processing Systems and Bio-Engineering for the technical aspects and the Department of Educational Research for the evaluation of formative efficacy of these tools. The project included different phases: wireless infrastructure installation and configuration; set up of a system for secure wireless access; development of services to be distributed through the wireless network; teacher and student training; monitoring of the project and gathering of feedback; analysis of the results.

2 The project

2.1 Goals

At the Campus Bio-Medico University in Rome we have been introduced to the experimental use of wireless networks and portable devices since more than five years and several research activities are on going to deal with this issues. As recipient of HP 2003 Mobility Grant and HP 2005 Technology for Teaching Grant, our University has carried out many projects to assess the use of wireless networks and portable devices (Pocket and Tablet PCs) for both classroom activities and professional training on the job. The projects, concerning both the Faculties of Medicine (including Medicine, Nursing, Dietetics and Science of Nutrition) and Engineering, involved more than 300 students in 4 years. Among the activities was HISS (*Hospital System for Students*), a project carried out in 2003-2004 under the financial support of Hewlett-Packard, which involved in the use of PDAs the students of medicine, nursing and dietetics practising in the ward. Two years later we developed MOPS, for Engineering students' Mobile Problem Solving.

At the beginning of 2007 we launched the We-Com programme, destined to enhance the use of mobile technology at University and to encourage teachers to adopt new pedagogical models that could benefit from the presence of wireless connections. This changed teachers' attitude towards technology. From the beginning of 2008 we started an intensive use in classroom experiences, involving those teachers who were ready to redesign their courses.

2.2 Content and Teaching Strategies

Rather than make an extensive testing, we chose to start pilot projects in different courses: the English course for 1st year students of Nursing and Dietetics; all 3rd year Medicine courses; the course of Image Processing and Transmission and the course of Telematics for 4th year Bio-Engineering Students.

Before starting the project we carried out a survey to investigate on students' attitude and ICT skills, and on the availability of hardware (pocket, laptop and tablet pc).

Furthermore we interviewed teachers in order to gather useful information for the best didactical uses, to identify the kind of training they needed and to provide opportunities for intervention in the various courses.

Although most teachers say that they daily use internet and e-mail, the teaching is based primarily on traditional methods. The objective of the project was to produce a renewal of teaching methods, training teachers so that they can produce their own multimedia resources.

However, not all the teachers have welcomed this news, because the time and resources committed to improving the teaching are not paid. Many teachers asked for credits for the extra effort required by the project.

Teachers' training was oriented by the specific needs of each course: a sort of 'guided tour' among examples, problem solving and exercises. The contents were various. Many solutions were based on Moodle, an open source community-based tool for learning. Our University had adopted it two years before (http://moodle.unicampus.it), but only a few teachers were using it. In some other cases we found 'tailored solutions': for example for Clinical Methodology (3rd year Medicine) we developed an EBM course that, besides giving some historical and theoretical elements, was all based on problem solving. Students were given cases and a portable pc to solve them looking for the best evidence available in specific databases. With Bio-Engineering students we tested innovative tools like Ubiquitous Presenter, an outgrowth of University of Washington's Classroom Presenter, a program that uses Tablet PC ink to allow instructors to annotate pre-prepared slides and students to create submissions for in-class activities. We organized videoconferences and produced podcasting in order to make more interactive frontal lessons and to create an on-line multimedia archive.

3 The survey

3.1 The theoretical background

The theoretical background of the survey was represented by the latest studies on the so-called 'net-generation' (Tapscott, 1998), i.e. the generation of 'digital natives' (Prensky, 2001), formed by young people born between 1980

and 1994. According to these studies digital natives are at university: they speak a language that their teachers, 'immigrants' in the digital land, can't understand. We wanted to test if this label was applicable to our university students.

In addition to these studies, we took into account the line of research, very extensive, on the process of diffusion of innovations, since the early contributions of the French sociologist G. Tarde (1903), through those of B. Ryan, N. Gross (1943), which identified five categories of people, according to their different involvement in the spreading of innovations. In the Sixties this classification was proposed again by E. Rogers (1962) who distinguished among innovators (venturesome, educated people, who use multiple info sources), early adopters (social leaders, popular, educated), early majority (deliberate, many informal social contacts); late majority (sceptical, traditional, lower socio-economic status); laggards – neighbours and friends are main info sources, fear of debt. Rogers theorized that innovations would spread through society in an "S curve", as the early adopters select the technology first, followed by the majority, until a technology or innovation is common.

Our hypothesis was that, thanks to the project, our students' attitude could change and some of them could pass from resistance to enthusiasm for innovation.

3.2 The target and the questionnaire

A self-administered questionnaire was given to a sample of 90 students, representative of the total population of our university (800 students). The questionnaire included 18 questions, presented in a variety of different styles: multiple choice, Likert scale and free text. They were created to investigate 4 main areas:

- ICT skills;
- hardware availability;
- attitude to multimedia learning and to peer to peer exchange;
- student's centered innovation process.

3.3 The results of the pre-test survey

The results of the first survey outlined a very different picture from what we had expected. Our students are definitely different from the American 'digital natives'. The majority of them (96.4%) have some familiarity with digital tools and, in particular, with the Internet, but their use is limited. Internet is mainly used to perform (on average) 2 or 3 tasks: research (79 students out of 90), e-mail (72/90) and didactical activities (51/90). Our

students often don't play an active role in the process of diffusion of innovation. Their attitude is not always positive: some of them fear that these instruments may limit their reasoning and thus be dangerous for people preparing for healthcare professions.

It seems that the digital natives generation, in Italy, is not yet arrived at university. Perhaps this label can be more correctly be used with students who attend now the middle school and secondary school.

4 Project outcomes

After the project we registered a significant increase in wireless network logs and Moodle access (they tripled during the project, with positive effects even at long distance). The project improved the technological level of the University, despite some technical problems (for example for PC with different operating systems - Linux or Mac OS) and some organizational problems (not all the teachers were available for the project).

4.1 The results of the post-test survey

After the project the ICT skills of the students were remarkably improved and, furthermore, their awareness in the use of technology was enhanced. For example the number of positive answers to the question "Do you know what is a wireless network?" increased by 9%, including both those who say that they know what is a wireless network (+4% compared to the pre-test survey) and those who use it (+ 5%).

The data showed that the project didn't affect those who never use the internet (same rate as the previous test: 3%), but, in the group of students who use internet every day, it increased the number of hours per day (+9%). Furthermore, compared with the previous phase, there was a raise in the use of internet for educational purposes (+16%) and Moodle, which was used to download resources from 50% of students.

As for the peer-to-peer activities, sharing of notes, recordings and educational materials among students, we saw a decrease: it seems that students didn't need to share material during the project, maybe because everything was already available on Moodle. Students also demonstrated a strong appreciation for all initiatives and efforts of teachers to propose new methods and tools. Some of them perceived a sense of advantage and greater competence in the use of digital tools.

We assigned a total score to each questionnaire (sum of the four variables) in order to classify users according to Rogers' categories. Previously we determined the range of values corresponding to each category.

TABLE 1
Attribution to Rogers' categories

Questionnaire Total Score	Tipology (based on Rogers' Categories)
from 20 to 30	Innovator
from 10 to 19	early adopter
From +9 to 9	early majority
from -10 to 19	late majority
from -20 to 30	Laggards

After the project most of the students resulted distributed between the "early majority" (+ 22% compared to the pre-test) and the "early adopters" (+ 9%).

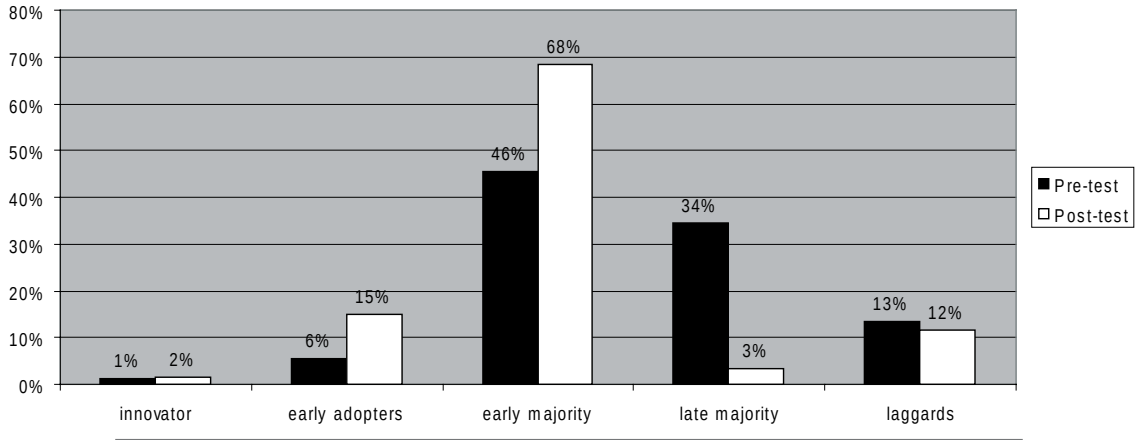

Figure 1. Users according to Roger's categories : Pre-test data vs. Post-test data

4.2 Related works

In 2002 the Medicine Department of the University of Milan developed a project called "Campus Doctor Online", with the aim of providing an online training support to traditional, in presence, teaching activities' (Pinelli *et al*., 2003). In the same year the University of Florence (Pettenati, 2002) carried out a similar project limited to the courses of Engineering. The good results convinced the project's principal investigators to extend the experience to other courses. Previously they made a survey on teachers' attitude (Selisca-Martinelli, 2002), with encouraging results: a good confidence of the teachers with the tools and a certain confidence in the possibilities for technology supported

didactics, which could complement - not replace- the traditional one.

Particular extension has the wireless Urbino Campus Project (http://www.wireless-campus.it/), a wireless network that extends throughout the Province of Pesaro and Urbino, playing the role of civic network not only for University students, but for all the inhabitants and the visitors of the Province.

A survey on the use of technologies by the new generation of 'digital natives' in the USA involved 4364 students - between 13 and 25 years old - from 32 colleges in 5 different federal states. All students of the survey use Internet: students of the 1st year, who often live in college, access the Internet through the University network (82.2%), while older students access it through external suppliers of services (56.4%). The main activities performed are: preparation of documents and papers (99.5%), mailing (99.5%), surfing Internet for entertainment (97.2%); didactics activities (96.4%).

5 Conclusions

The experience gathered from the project included critical points and opportunities that could be relevant for future programmes and, in general, for the replicability in other contexts.

Teaching strategies and educational challenges. The Universities strategies for the use of technology are increasingly characterized by a certain 'pressure' (Wilson *et al.*, 2007): on one side, the greater technological innovation of the 'outside world', i.e. the availability of more personal resources (skills and tools); on the other side, University budget cuttings. In this context it would be useful to decentralize the responsibility of the acquisition and maintenance of resources, leaving to the ICT Department of the universities the task of monitoring the use and ensure security, thus creating an integration of personal and institutional resources.

Management process. There are two ways to introduce an innovation: "top-down" and "buttom-up". The two ways must integrate and mutually enhance. Innovation can't be "super-imposed" but the process can be coordinated and directed so that it doesn't depend only on the goodwill of the individual teacher or student, but it is supported at all stages: tecnical, methodological and didactic.

Hardware infrastructure. The availability of hardware for teachers who have no own resources (computers, networks, specific application) is necessary in order to achieve the research goals. For this project, University Campus Bio-Medico bought laptop computers and managed them through a centralized services center. However we tried, in all the possible ways, to encourage the use of personal resources and to integrate them in the project.

Software infrastructure. While Moodle is a very good platform, it is neces-

sary to integrate it with other tools (specific applications, selected from the open source ones or possibly created *ad hoc*) for the implementation of various learning environments. Teachers aren't compelled to know all the tools but they can use them on suggestion by experts. It would be useful to have a team, with ICT and educational experts, that periodically make a review of the tools and present them to the teachers, following them during classroom activities. Furthermore the team should also be able to develop *ad hoc* applications on teachers' request.

Architectural infrastructure. Besides traditional classrooms and laboratories it would be useful to have open areas, covered by the wireless network, in order to allow students to study individually or in group. Ideally, each area could support different kind of purpose: simulations, problem solving and other group activities; individual study; entertainment. The environment could also be enough flexible to support different kind of activities, taking into account also possible future needs, so that space itself can be reconfigured and well reallocated.

Learning Object. D. Wiley (2000) defines LO "any digital or non-digital resource that can be reused to support learning". It's not worth, in general, that teachers always create new contents starting from zero, while it is plausible that they could build on already existing resources, organized and made available by a university team of experts .

Tutorial system. It is very important that tutors should have both technical skills and subject expertise to be able to follow the students. In some cases, forms of peer-tutoring among students could be encouraged.

Formal and informal. Near the activities and instructional technologies, more importance should be given to informal learning and free exchange among the students (podcasting, forum, file-sharing). In this way, the ICT tools used for educational goals can be derived directly from those that young people employ everyday for personal use or for entertainment.

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