

PpMC (*Pocket PC-mediated communication*) in a catering school Students as *core business* of information technology development

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Abstract

MOWECS (*Mobile Wireless Education in a Catering School*) is a HP and Siemens funded project, whose aim is to investigate the best use of mobile wireless devices in a catering school to enhance teaching 'on the job' (in the kitchen, in the laundry, in the rooms). The project is being developed at SAFI, a residential professional school, from October 2004 to October 2005. Within this scenario we analyzed all the existing structures of communication and monitored the change in these structures during the phases of users' training to the new technologies and of development of mobile contents. We aimed to make it easier learning and working with pocket devices by putting people and the interaction among them in the centre of the process of innovation and evaluating advantages and disadvantages not only for the 'on the job' training, but also for communication and interaction.

Introduction

Wireless network enabled mobile devices offer interesting application in working environments, particularly in catering domains, where rapidity of communication and interaction is a key element. In this sector the promise of mobile devices lies not in their capacity to duplicate the capabilities of desktop machines, but rather in the possibility of enabling location-specific tasks. This feature presents a new situated context for PDA applications and provides new design and usability evaluation challenges. One of them is how intuitive interface for mobile devices can be designed that enable access to location-specific services usable across locations.

A catering school normally runs a good part of its teaching in a training environment. It is difficult to access textual or multimedia resources while in a kitchen or in a ironing room or in a bedroom. Books can be too heavy to carry, whiteboards cannot be placed where they are more needed, digital projectors and screens are almost impossible to integrate in a kitchen and cannot be carried along all the bedrooms. Therefore the introduction of wireless mobile devices helps in providing the necessary information in any place.

Background

SAFI is a professional school attended by girls who are living in a college for the entire period of their study. The students are 14 to 19 years old and come mostly from small towns in the South of Italy, where they have scarce possibilities of accessing higher education. The school started its activity in 1964 and in 2001 was recognized by the Italian Ministry of Education. The 40

residential students have the opportunity to study and work in a real environment: they train themselves, together with professionals, caring for food, laundry and cleaning of a hall of Residence for students of the ELIS Vocational Training School.

SAFI importance can be measured by a Google search on the words Istituto Professionale Alberghiero, where it ranks first (search performed on April 4, 2005).

The presence of ELIS School in the same building enhances the project in the technology issues: the know-how of ELIS allows for a high quality implementation and management of the hardware and software involved.

Communication at SAFI before MOWECS

Our point of view was ethnographic more than technological. Starting from studies on collaboration and communication (Plowman et al., 1995) and from the researches on Communities and technologies presented in the last edition of this Workshop (Communities and Technologies 2003), we analyzed all the existing structures of communication in the school: the interaction between students and their tutors, the organization in the different areas, the different ways of communicating inside and among them, the contents of messages. In the project were involved students of the first, second and third year, their teachers and tutors).

We monitored both the communication 'on the job' (in the kitchen, in the office and in the wardrobe) and 'in the classroom', trying to change the traditional way of teaching subjects like Italian literature, English and French grammar.

For the 'on the job' training we observed that within each area communication is mainly orally performed. Furthermore, in some areas, like kitchen and office, all the tasks assigned to the students are displayed on a blackboard.

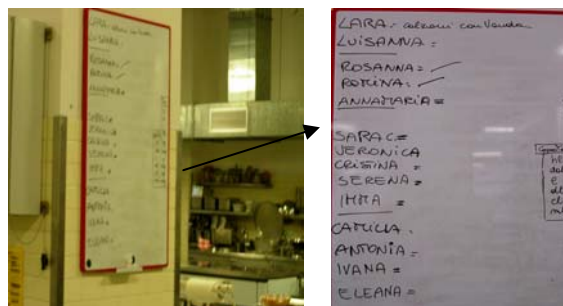


Fig. 1 Blackboard in the kitchen

The exchange of messages among the different areas is performed mainly by telephone. Urgent communications can be sent by a 'suite', a student or a

tutor, that is like 'jolly', i.e she has no fixed task, but can bring things from one area to another. The contents of communication can be fixed (receipts, office instructions) and variable (menu, number of presents, diets, things to buy).

Project Goals and Methodology

Our investigation areas were four: education, mobility, communication and user-interface. In these field our attention was focused on: ubiquitous computing and access to necessary information in any place; use of handheld devices in complex environments like hotels, residences or tourist resorts; adaptation or preparation of teaching materials to be displayed on pocket or tablet pc; test the usefulness of mobile wireless devices in a catering school, as in all the activities which need a training 'on the field'.

The first activity was the installation of the access points in all laboratories and places where the students are supposed to use the mobile devices. Test for interferences were accomplished where needed: for example in the laundry, where there are strong power machines. For software development we used rapid prototyping in order to achieve valuable results in a short time. We used various languages (HTML; ASP, Jsp) and different kind of resources (web pages, excel files, video and audio recordings, forms to insert or retrieve information from database etc.). We tested both on-line and off line applications, with adaptive interface for different kind of devices. For the project we were given 2 Compaq notebooks with wireless LAN card, 2 Compaq tablet PC, 10 Pocket-PC LOOX 700 Fujitsu Siemens; 5 Pocket-PC IPAQ h4155 HP; 5 Pocket-PC IPAQ h5500 HP.

Project Development

Wireless technology has been used to ensure fast localization (by voice, with VoIP on the WLAN, or by instant messaging) and immediate access to useful information on the job.

Texts, reports and scanned pictures were prepared for the specific teaching on small displays and medium. Some of the lessons in the classroom or in the working environment were video recorded. Thus the students were able to review what they learned using the iPAQ, at any time and in any place. Students were able to get everywhere multimedia resources like receipts with photos and check-list of instructions; video instructions for the oven, for the vegetables and meat cut; images of mise-en-place for different numbers of guests; forms to calculate the cost of a meal and the total expense of a day; forms to collect the number of guests in the different areas, to plan the menu of the day, to modify it for diet needs, to record new receipts, to check the things to buy and to assign tasks to the students. Besides the teaching material prepared on purpose students could also access resources on the web. A simple search system, derived from the one developed by Mediateca-ELIS was used, in order to retrieve the proper information in a short time.

The enthusiasm spread itself so much that we were asked to extend the use of pocket pc also to mobile learning. The teachers of Italian literature, French and English grammar changed their way of doing lesson and used pocket pc. The teaching became more interactive: instead of books, students used pocket pc where they could read, hear the exact pronunciation of words, listen to music, see pictures of famous paintings, watch videos, search for specific subjects.



Fig. 2 MOWECS Index



Fig. 3 Italian literature section

Data Exchange and Interface Design

First of all we evaluated various models of commercial software for restaurants. None of them fitted the needs of our school. Then we created a prototype using HandBase, a mobile relational database application, that has also desktop components to convert data from another format into HandBase. Specifically the component 'Data Exchange' is a conversion tool that works between HandBase and MS-Access or any ODBC enabled database. We used relationship to perform one-to-one, one-to-many and many-to-many type joins between different database in HandBase format. We then mapped their tables with those of a MS-Access, so that when users synchronized the data they had collected, the server MS-Access database was upgraded.

HandBase allowed us to build completely customized data entry interfaces, adaptable to different kind of devices: it automatically resizes depending on the dimensions of browser in which it is displayed. Users were involved in interface development, so that the design cycle was iterative and evolutionary: after rapid prototyping, the interface changed various times taking into account users' needs and preferences. Some of the forms were restructured many times before getting their final shape: for example the one to collect the number of guests for each meal and the one to plan the menu. In either cases users preferred essential structures to colourful and complex one; furthermore they didn't want the contents to be spread in different pages and wanted to have on one page most options. In the end both the guests' and the menus' forms were converted into one form in two sections, with essential elements and pop-up with predefined options.

Fig. 4a Form to collect the number of guests (first version)

Fig. 4b Form to collect the number of guests (second version)

Fig. 4c Form to plan the menu (first version)

Fig. 4d Form to plan the menu and to collect the number of guests (last version)

Users' feedback

We analyzed the feedback of students, teachers and tutors using the categories created by Everett Rogers (1995), a theorist who spent over 30 years studying the diffusion of innovations of all kinds, from qwerty keyboards to new agricultural methods in developing countries. According to Rogers, the characteristics of an innovation, as perceived by the members of a social system, determine its rate of adoption. Five attributes of innovations are: relative advantage, compatibility, complexity, trialability and observability. We prepared a paper questionnaire, which was distributed to all the users. The results were different depending on the role of the user: 90% of the students appreciated most the usability of handheld devices; more than 50% of the tutors stressed the compatibility with their tasks; 50% of the teachers observed a relative advantage in doing with handheld devices, represented by multimedia resources availability, which makes lessons more pleasant.

Users' feedback was monitored also with other techniques indicated by theorists of *interaction design* (Preece et al. 2004):

- interviews where they were free to express any opinion about the news system;
- indicators concerning the activities performed, like the time needed to accomplish a task, the accuracy degree, the possibility to prevent mistakes, the improvements in training and learning;
- indicators concerning the difficulties in using the device (if users spent more than 10 minutes in learning how to perform a new function, the interface was changed).

Among the advantages pointed out during interviews, some were particularly remarkable. Using handheld devices "you can communicate more rapidly", "learning is more pleasant", "everything is under control", "you can get useful information where you need", "you can retrieve information faster", "you can get images of what you have done". Among the disadvantages, one tutor remarked that "communicating via pocket pc the tasks to the students", she lacked "personal control over them and sometimes could be misunderstood"; some teachers were worried about the time the students could waste playing with the new

device; some others observed that "those who were not able to use it could get isolated".

We succeeded in overcoming this difficulty in the following way: after an initial phase of general training, more advanced users helped those who were not so rapid in learning and this generated a new process of communication. The fact that more expert students became the teachers of those less skilled had also an enormous importance for the growth of their sense of responsibility.

Unexpected results

1) Communication across generation

Most students used the pocket pc during on the job training and for mobile learning, as seen before. Besides those activities, handheld devices proved even more useful for new creative tasks, for which the pocket pc does not substitute some other medium (paper, desktop pc etc.), but enables users to have together more resources. The students of the second year were able to perform a research on traditional way of cooking and receipts in their Region, Lazio. Equipped with Pocket Pcs they were able to take, at the same time, written notes, photos and audio recording. They asked their grandmothers for receipts and for information on rites, anecdotes and everything concerning food in the past. They went into traditional restaurants and interviewed the oldest people in the kitchen, taking pictures of preparation, tools and of the environment. They visited antiques' markets to identify the objects used in traditional popular cooking. They also studied all the religious and familiar feasts in which food played an important role, and recorded on pocket pc the music played in those circumstances.

All the information collected are published in a website (<http://safel.elis.org/Progetti/default.asp>).

2) Creative activities

The availability of a digital camera attached to an iPAQ gives the chance of taking pictures of the peculiar situation in which a student is involved for further study or, for example, allows taking a photo of a special food preparation to compare it with the required one. Students of the first year used handheld devices to create vegetal sculptures from pictures scanned from

books or found in internet. They looked at the models and the instructions on the mobile device and carved fruits and vegetables in creative shapes, such as flowers, animals etc. Then they photographed their own creatures and sent them to the teachers.



Fig. 5 Vegetables sculptures

Evaluation and conclusions

We monitored the change in communication structures during the phases of users' training to the new technologies and of development of mobile contents. We must conclude that Pocket PC-mediated communication can't substitute personal interaction and control, but can ease the relationships helping people to keeping in touch constantly. Furthermore, by using mobile devices, students became aware of their utility in complex environments like hotels, residences or tourist resorts and they will be able to suggest their future employers the use of wireless technology to ensure fast localization, rapid communication and more efficient organization.

Comparing our experience with analogous ones (Cacace et al. 2004, Bernaschi et al. 2004), we can conclude that a key element for the success of an innovation process is to focus on users and on the interaction among them. The person is central, not the technology: the pc adapts to people, it helps them pay

attention to the tasks they have to accomplish and to the people to whom their work is directed.

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For more information on the project see <http://projects.elis.org/mowecs/>.

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