Abstract
Framed in the scope of in-service teacher education on ICT, this paper proposes a school-based program in which the methodology of project work is applied to promote participants’ innovative practices.

The structure of the program included in presence sessions that took place during five months, and independent study sessions assisted at distance. Participants were responsible for both their learning and their contribution to the project under development.

Program evaluation has shown participants’ positive attitudes towards project work methodology and ICT. Participants were able to transfer the new skills into new situations in their schools, to encourage other teachers in the school regarding the use of ICT, and to introduce ICT in classroom practices.

Keywords
Information and communication technology, project work, teacher education.

Introduction
The purposes of this paper are the following: to describe a program for in-service teacher education on the educational use of Information and Communication Technology (ICT) that is school centred and based on project work; to conclude about the effects of the program on teachers’ practices, and to present suggestions for the design of in-service teacher education programs.

During the eighties the Portuguese government supported several projects for the implementation of ICT in schools. The Minerva project has been considered as the most influential one due to its effects on teachers’ practices and schools’ approaches to ICT. According to Ponte [1], Minerva’s participants enhanced project work as an appropriate strategy in order to promote the use of the computer as a tool in the hand of the pupil. DAPP [2], a department of the Ministry of Education, launched in 1996 the program Nónio Século XXI aiming at the general production, application and use of ICT in the educational system. Nónio is viewed as a continuation of the former Minerva because it follows its principles about ICT implementation in schools as well as its experiences with teachers and pupils.

Under the scope of Nónio, k-12 schools have submitted, since 1997, project proposals in order to receive appropriate financing for ICT implementation. Special institutions, called Competency Centres, have been created with the purpose to support schools implementing their projects. Support has consisted mainly in teacher training initiatives. In 1997 the Nónio Competency Centre of the Faculty of Sciences of the University of Lisbon (Centro de Competência Nónio FCUL) [3] was created in order to promote teachers’ technical and pedagogical skills on the educational use of ICT in science, mathematics and information science.

Data from recent research centred on teachers’ personal development on the use of ICT point out teachers’ new skills regarding not only the technology but also their practices, and enhance the role of collaborative approaches involving teachers in the context of their own schools. Results from the Minerva project suggest the creation of teacher education programs centred in
the following issues that appraise reflexive attitudes and self-improvement: schools’ projects, teachers’ professional development, group work, and sharing of experiences. Teacher training initiatives offered by the Nónio Competency Centre are grounded in results from research and experience as well as the needs conveyed by schools. The program described in this paper is part of such initiatives and was designed according to the following objectives: i) to reflect about the educational potentialities of ICT; ii) to encourage teachers for the implementation of ICT in their practices; iii) to apply project work as a preferential methodology for ICT implementation; iv) to promote teachers ownership and assessment of project work.

The workshop was the chosen format for the program. It included instructional sessions in presence, alternating with self-study periods. These periods involved exchange of experiences using different communication resources, from the telephone and fax to the computer (e-mail and Internet).

**In-service teacher education on ICT**

Tripa [4] suggests that processes of change in schools are generally spontaneous, based on participants’ creativity, and emerge as attempts to solve identified problems. Chagas & Abegg [5] discuss that teachers spontaneously engage in innovative projects with the purpose to enrich their regular practices. Teachers’ attitudes are decisive for change to happen. The quality of teachers’ working relationships, as well as the school climate and the appraisal of creativity are essential factors for the success of any innovation. In the presence of such factors, innovation fits the school context, making possible a chain of other innovative initiatives.

The assumption that teachers play a leading role in school’s change implies rethinking the way they are trained. This is one of the most sensible issues about educational change. Particular conditions are needed in order to create coherent training programs, adjusted to the teachers’ working conditions, needs, and receptivity to learning. Canário [6] advocates that teacher education programs should value opportunities for practice and reflection about practice, allowing teachers to innovate, having as a starting point the results of their analysis about their own practices. Elliot [7] defends that teacher education programs should stimulate an investigative attitude.

In general, teachers feel insecure when running classroom activities with ICT. They have difficulties accepting students’ superiority in that domain. According to Mallam [8], even when teachers master relevant technical aspects, they still use conventional teaching methodologies and show conservative ways conducting the class. An appropriate continuous teacher education program should support teachers in order to overcome such difficulties. Mallam [8] points out research about the process of adult education that may shed some light for the design of teacher education programs. One aspect is the need adults experience to relate learning with experience. They need to perceive how the new skills continuously integrate in regular professional activities. Another aspect deals with the adults’ characteristics as learners. They are autonomous, are used to conduct their own work, and prefer a learning facilitator as a teacher than a conventional one.

In-service teacher education cannot remain separated from the reality of schools nor professional practice. The usual idea that content mastery and awareness of the “methods of good teaching” are the most important issues in teacher education, does not meet the challenges teachers are facing today. Teachers are active learners. Up-to-date training programs offer different situations in which teachers have the opportunity to experience new materials and methodologies, to solve both school and classroom based problems and to think about their experiences. One cannot expect teachers will provide their students with opportunities to solve problems, to think critically, to access and process information, to use ICT, and to collaborate with their colleagues if identical conditions will not be offered to them. Therefore, several questions that have originated from the experience on teacher education are presently the focus of educational research:

- What are the appropriate methods in order to train teachers on the educational use of ICT?
- What do teachers need in order to feel motivated toward innovation and change?

Project work enables concrete and meaningful learning in which teachers become the centre of their own training and education. Nias [9] remarks that teachers feel much more spontaneous, intuitive, relaxed, and happy with themselves when they have the control of their own work. When involved in project based work teachers develop positive attitudes toward innovation, contributing to their self-preparation, and professional and personal realisation.

The introduction of Internet by the teachers in the culture of the school, can originate conditions for consistent and autonomous learning either for teachers and students since it encourages collaborative work and shared reflection. It also may work as a bridge between the school and the community. With the support of Internet both as information source and a communication tool teachers can share experiences and construct knowledge. According to Musciella & DiMauro [10] Internet is a new tool for learning, enabling innovative approaches for the professional
development of teachers. However, the educational use of Internet still raises many questions. Sellinger [11] resumes educators’ present concerns, stating that in order to profit from the use of Internet one needs initial orientation and continuous support. Experience and research are needed in order to understand the best ways of Internet use in the context of in-service teacher education.

The participants

The participants of the workshop were fourteen teachers of the schools associated to the Nónio Competency Centre. There were representatives from all teaching levels and only two teachers claimed having some experience in computer use.

The program

Sessions took place in different schools according to the participants’ offer. This means that participants had the opportunity to visit different schools and to perceive different ways to approach ICT in the school context.

There were six sessions in presence of about four hours each, completing 25 hours. These sessions ran from February to June 1999. During the first sessions the philosophy and methodology of project work was introduced. Giving the lack of experience of the participants in computer use, there were some preliminary activities regarding the use of e-mail and information search on Internet. Participants exchanged e-mail messages and searched for specific information, under the scope of an initial, tentative project. Later, working in small groups, participants started the definition and design of a project centred on a problem that congregated their concerns: how to improve the quality of life in the school? Each group approached one selected sub-problem, such as: environmental issues, health education, human rights, schools’ resource centres, and schools’ projects.

In the following sessions participants searched for information using conventional resources available in their own schools. Progressively, they widened the range of resources they were able to use accessing information available in multimedia sources such as CD-ROMs and Internet.

Between sessions in presence, participants worked on their projects as a self-study component of the workshop. During these periods, participants met together and communicate through e-mail with the purpose to share experiences, such as the results of the searches on Internet, to exchange information about the development of each sub-project, and to reflect about the possibility to introduce the new skills on ICT in their classroom practices. The supervisor participated in the process of message exchange, giving support, addressing useful questions for the development of each sub-project, and providing guidance regarding information search procedures.

In the last session each group presented their contribution for the solution of the initial problem. This product was the result of participants’ in-depth searches and collaborative work, activities that became feasible in the presence of ICT. The participants’ presentations were supported by computer based illustrations and materials, and some of them are presently available in the WWW site of the Nónio Competency Centre.

Results

Participants answered to a questionnaire that was created with the purpose to obtain evaluation data about the training programs offered by the Nónio Competency Centre. The questionnaire contained one open and 21 close questions. The questions addressed the following issues about the workshop: content, methods and resources, supervisors, and organization. The open question asked for comments and suggestions.

The responses showed that participants considered the workshop good or very good in all the issues, with the exception of organization. This issue was considered good with some remarks that were identified in the analysis of the open question, about the reduced number of hours, not allowing time for discussion, and poor facilities in some sessions.

Respondents enhanced the relevance of the workshop, allowing knowledge acquisition about the Internet, useful knowledge to convey to the pupils, and a new working perspective. They considered the methodology attractive and playful, leading to excellent working climate and motivation to learning. Some participants made explicit changes in their attitudes toward ICT. Some comments are particularly interesting, such as “now I see that the computer is not as impersonal as I used to think”, “now I realize that it is possible pupils do more things with the computer than to play”.

In summary, results revealed participants’ general satisfaction. They showed willingness both to continue their preparation regarding the use of ICT and to apply their new knowledge with students. Consistently, they recommended a longer workshop in order to enable a better consolidation of the new skills, and to give support for the implementation in the classroom.
In December of 1999, participants were interviewed with the purpose to elucidate about how they were applying new knowledge and skills about ICT and project work. Eleven teachers declared having been able to convey what they had learned about ICT to other colleagues and students in the scope of out-of-the-classroom projects involving interdisciplinary approaches. However, only eight teachers admitted having been able to apply project work methodology in the context of ICT-based school’s projects. Six teachers stated having used ICT in the classroom with their students in order to search for information related to the subjects under study, but they haven’t implemented project work.

In 1999/00 thirteen of the fourteen teachers that participated in the workshop, enrolled in new teacher education programs promoted by the Nónio Competency Centre.

**Conclusion**

Results support the assumption that a slow, progressive and meaningful involvement of teachers in the school context with their partners is more likely to lead to innovation and change in which concerns the educational use of ICT. Therefore, the way participants progressed in this program centred on ICT, project work and collaborative work suggests that in-service teacher education programs should:

− ground on self preparation and co-operation among teachers;
− enable teachers’ needs and concerns to become a source for professional development;
− encourage teachers to express innovative ideas, to experiment the materials, to design strategies, to suggest activities, and to select materials;
− occur in the learning context, among partners.

In-service teacher education on ICT is a complex challenge that asks for more interpretative research focused on the processes experienced by teachers.

**References**


**Biography**

Rosa Tripa is a member of the Nónio Competency Center of the Faculty of Sciences of Lisbon. She has been involved in issues related to in-service teacher training on ICT since 1998 when she presented her master’s thesis. Presently her main interests are focused on the processes of change management in schools.

Isabel Chagas is the coordinator of the Nónio Competency Center of the Faculty of Sciences of the University of Lisbon. She is also a full time professor and a member of the research center in the same faculty. She has been involved in several research projects on ICT in general, and in initial and in-service training on ICT in particular.