Historical Overview of Computer Use in Brazilian Teaching

Márcia R. Notare, Simone C. Mendes, Ingrid V. Mito and Tiarajú A. Diverio
Instituto de Informática e PPGC da UFRGS, C.P. 15064, 91501-970 Porto Alegre, Brazil
notare@inf.ufrgs.br

Keywords: developing countries, national programme

Abstract This paper presents a historical overview of the use of information technology in the Brazilian Education. It identifies the main phases of the process of computer usage in education. It offers a general view of the main Brazilian Educational Projects that support the process of introducing computers in schools all over the country. Computer usage phases in Brazilian education are also described. The evolution of resources used by the teachers are analysed. Finally, tools for planning, creating and maintaining educational environments are described, and some distance teaching environments available in the Web are characterised, according to their functionality and applicability.

1. INTRODUCTION

Nowadays, computers are no longer 'specialised products'; they have to be considered now as 'household appliances'. Their sales are not restricted to specialised computer stores anymore; now these machines can be acquired in department stores and supermarkets. Another change that came along with the computerisation and the 'popularisation of the machine' is the fact that computer is now common equipment for most of the Brazilian middle-class houses. And almost all of them can be connected to the Internet. In the same

way technology has been improved through the introduction and development of informatics, so education must present the same evolution characteristics. This is the very aspect of interest to this study.

Some time ago, when we thought about education we would think about a classroom in which a teacher, students, blackboard and schoolbook would form a picture of tradition and good results. The answers to the questions below compose a timeline in which we can observe the adaptation phases of education to the new technologies that are capable of assisting and modifying this process.

How has this evolution happened?

How was the reaction and adaptation of education in the beginning of computerisation?

What is the actual reality of education in this aspect? Has there been any advancement?

This paper presents an analysis of the principal phases of the evolution process of computer usage in education in Brazilian Educational Institutions (Moraes 1997). The evolution of the process will be presented based on the reality of some of the main Brazilian Universities involved with Informatics in Education.

2. SOME BRAZILIAN EDUCATIONAL PROJECTS

The first governmental initiatives for an incentive to the introduction of informatics in Brazilian Education were taken around 1981 through the *EDUCOM Project*. This project had its origins in the 'I Seminário Nacional de Informática na Educação' (1st National Seminar on Informatics in Education) held in Brasilia the same year. The project aimed at implementing pilot-centres in which the formation of professionals capable of using the new technologies in classroom would be available. Finally, in 1983 the *EDUCOM Project* document was introduced as an interdisciplinary proposal, with the implementation of pilot-centres with infrastructure meant to provide capable professionals for further implementation at schools.

The *FORMAR Project* was implemented in 1987, through two courses about specialisation of informatics in education, at an ungraduate level, held at UNICAMP University (University of Campinas, SP). The project was meant to give capability to teachers from public schools. The capability of the teachers of this project came from pilot-centres of the *EDUCOM Project*. The graduate teachers would design and implement, together with their Education Secretariat, a CIED – Educational Informatics Centre, with technical and financial support from the Education Ministry. After the

accomplishment of the *FORMAR Project*, 17 CIED's were introduced, one at each Brazilian State.

The National Program of Educational Informatics – *PRONINFE*, of 1989, aimed at developing the educational informatics in Brazil. The program was developed through projects and activities, on solid and updated pedagogical fundamentals, in order to guarantee the vital scientific, technical and political unity to the success of the efforts and investment involved. The program also intended, among other things, to give support to the development and utilisation of Computer Science in the 1st, 2nd and 3rd degrees and special education; to promote the infrastructure of support related to the creation of several centres spread all the country, by means of consolidating and integrating researches; to produce qualified human resources and to produce, acquire, adapt and evaluate educational software.

Finally, the *PROINFO* – National Program on Informatics in Education – was launched (MEC/SEED/PROINFO 1999). The *PROINFO* had main initial targets to finance the introduction of the information technology and telecommunications in the Fundamental and Middle public education and to initiate the universalisation process of the use of new technologies into the educational public system. The program's main purposes were to improve quality on the teaching-learning process and at the same time to make possible the creation of a new cognitive pedagogy in the schools environments through adequate incorporation of the new information technologies throughout the schools. All these would offer an education turned to the scientific and technological development. The *PROINFO*, by the time it was launched, anticipated some target actions such as the preparation and support of state projects on computers in education; planning the school's computerisation; support to school's projects; qualification of human resources; introduction of educational technology centres; definition of the technical specifications; and the follow-up and support to projects.

Nowadays, the Brazilian Education is divided into Fundamental Teaching, Middle Teaching and Superior Teaching. One of the government's actual concerns is the *TV-School Program*, which is a television channel via satellite exclusively dedicated to education. The main objectives of this program are the qualification of teachers from the public schools of Fundamental and Middle Teaching, as well as the enrichment of the teaching-learning process. And further, it aims at providing populations residing in the far-away areas of the country, such as Amazonian, with proper education.

3. PHASES OF THE COMPUTER USAGE IN EDUCATION

In this section, two subjects are discussed on the use of technologies in the classroom. The first concerns the use of the computer as a tool for helping students to develop reasoning and intelligence. The second shows the evolution of the use of the technologies by the teacher during the planning and presentation of their teaching.

3.1 The computer in the teaching-learning process

The first way computer was used in education, and the most diffused one in terms of quantity, was Computer Assisted Instruction (CAI), also known as Programmed Instruction. Programmed Instruction is composed, briefly, of repetitive exercises for fixing, tutorials and demonstrations. The most utilised ones are the repetitive exercises. They are programs that make the student to perform a sequence of exercises ordained by the degree of difficulty.

The tutorials are supposed to make the computer instruct the students, in the same way a teacher would do in individual contact with them. Usually, the tutorial provides the student with some information, followed by related questions, in which possible answers are foreseen by the system. The quality of the tutorial is measured by the capacity of the group that developed it in foreseeing all the possible entries, including and mainly the wrong ones.

Finally, we have demonstrations. The computer can give demonstrations in a classroom to a highly sophisticated degree. Graphic, sound and chromatic resources can be utilised and, consequently, the overhead projector and transparencies are gradually replaced. Undoubtedly, the computer's potential is demonstrated through the facility with which the variables can be manipulated and through the instantaneous feedback it provides.

However, Programmed Instruction, despite being more diffused, is not the only way of computer usage in teaching. Simulations and educational games are very important and have great pedagogical value. A simulation is a model that tries to imitate a real or imaginary system, based on an operation theory of this same system. Through the use of simulated programs the student can easily test complex hypothesis, manipulate variables and verify the model's behaviour under varied conditions and situations.

Pedagogical games are those that differ from the others by its purpose, which is explicitly to promote learning. Nevertheless, like all the other games, the pedagogical games are intended to be entertaining. There are

games that require from the student the application of logic and obviousness rules. This makes the student face thought, logic and language very seriously. The student learns to process information, make logical inferences and test conjectures.

Among the programming languages constructed for education, we have the LOGO language, which is the oldest and most diffused one. It is an extremely interactive and friendly language, which emphasises self-learning and which has rapidly become the most used one in the educational fields. Several studies have showed that learning through discovering, exploration, investigation and search not only have a special significance for the development of the cognitive structures (because it consists of high-significant learning for the student), but it is also retained for a longer period.

It is important to mention the use of application packages in education, such as the text editors, electronic spreadsheet, database managers and others. Such software can have a high practical and pedagogical potential.

However, during recent years, the STI's (Intelligent Tutorial Systems) have arisen. They are an evolution of the CAI's, used in the Programmed Instruction. STI's are computer programs that make use of the Artificial Intelligence in order to represent knowledge and provide the student with a better interaction with it. The main objective of the STI's is to make the computer adopt an intelligent conduct that allows it to control the acquisition process of knowledge and that provides the student with an adapted Instruction. Figure 1 graphically explains the phases approached in the text.

Figure 1. Ways of computer usage in the teaching-learning process

3.2 The evolution of pedagogical resources

Traditionally, classes were ministered with the help of books. With the introduction of the overhead projectors in the schools, teachers started to use hand-written transparencies. With the personal computers, the transparencies became more developed and printed, which produced a breakthrough in terms of visual quality.

Afterwards, came the tools to implement more creative classes, like the Microsoft Power Point – and the whole package Microsoft Office. Since

then, the content of the classes could be presented through transparencies with larger and better resolution. Its major advantage was the pre-format of transparencies provided by the tool.

The next step was the use of the World Wide Web. This way, teachers were able to update their contents and look for the latest researches in the Internet. And mainly, they could create their own pages using poor Html editors, which did not allow them to improve the environment from the graphic perspective.

Soon afterwards further tools arose, like the FrontPage, a Web manager. From then on, came the constructions of the first Web environments destined to be educational supports, and the first trials of virtual classes.

In the next phase, the Microsoft Office, and specially the PowerPoint, turned to be totally integrated with the Web. Documents created in these tools started to have the possibility to be saved in the Web's standard format, html. The last and big phase of this process is being initiated with the new version of this package, where we can have the total integration of the machine with the Web.

The computer usage evolution in teaching has been a gradual process. The insertion of technology in any area of education has followed the same sequence of steps. It is important to emphasise that the evolution has not necessarily passed through all the presented phases, but probably just a few of them occurred in a different way from the one presented in Figure 2. Besides this, the timeline illustrates a process that was initiated in main research centres, such as the universities. In those centres, this process has not been completed in all courses yet. We can notice a major development and utilisation of these resources in courses linked to the Exact Sciences, such as Engineering and Computer Science. In the other areas this process seems to be slower.

To most of the Fundamental and Middle education schools this is still a reality that is being implemented, or analysed by its educational professionals. The Figure 2 shows the timeline of the pedagogical tools used by the teacher.

Figure 2. The evolution of pedagogical tools

4. TOOLS AND ENVIRONMENTS FOR DISTANCE TEACHING

This section is dedicated to comments on tools and distance teaching environments considered important (Saba 1999).

4.1 Tools

There are several tools that help the implementation of EaD environments. A site can be composed of various resources that, when united, transform it into a consistent educational material/environment. Among them, we can list the following:

Discussion Classrooms: Allow communication 'in real time' among people through the textual language. They can be used for clarification of doubts, debates and discussions.

Search Engine: Searching sites used in order to locate sites' addresses of a specific subject in the Internet. Distance teaching environments usually have links available for the main sites that do this type of search.

Discussion Lists: Students and teachers broach questions for discussion. In this list, through the E-mail, all participant teachers and students have access to the sent messages. It is an asynchronous communication channel.

Electronic Book: Contains the contents treated in the virtual classes available in the sites. They can be transparencies of the disciplines, files with the contents, the very content available on the page or generated through finite automatons.

Online Exercises: Exercises created by the teacher and that may complement the learning, serve as access authorisation to the next content or evaluate the student. Their most common forms are questions of multiple choice and questions of true or false.

Videoconference: Synchronous meetings that utilise audio and video resources through a camera installed in the machine of each participant and through assistance of a videoconference tool.

Teleconference: Videos or previously recorded classes can be utilised and they are transmitted via satellite or via computer network to the receiver locations.

Nowadays we can find other resources in the web, such as: *pools*, which are tools that give support to, for instance, voted questions in classrooms and discussion lists; *vault*, which are special locations in which important questions or experiences are stored in order to be used in the future, where all have access to store or consult information; *threads*, which are tools that allow the visualisation of the directions that a certain message took, making possible the monitoring of discussions; *find*, which are search and consult engine that permit to locate a specific topic or word in a text.

For the construction of the site, the Html editors are used. The sites can be improved with visual resources in order to call the student's attention, such as flashes or pictures in motion.

4.2 Environment classification proposal

In this section we introduce some tools and EaD environments. The environments and tools have been classified according to their functionality and applicability. Depending on the point of view at the moment of the environment analysis and the considered aspects, they can be classified in more than one category.

4.2.1 Management systems for distance teaching

The Management Systems for Distance Teaching are tools that make possible the creation, administration and maintenance of virtual courses via Internet. The communication services offered by the tools are the electronic mail, chats, discussion lists, debates, news, and others. For administration, they usually have notice board, appointment, schedule, news.

4.2.2 Projects in Brazil

With the development of Distance Education via Internet in Brazil several projects started. Most are developed in universities, with the purpose of promote research in each area, publicise projects, articles, events and results and integrate the EaD community of the country. Some offer complete 'remote' courses, while others have just an informative character,

and offer collection of texts and articles of the area, specialists' reports or tips of links. Projects include:

- *Kidlink* Brazil (<http://venus.rdc.puc-rio.br/kids/kdlinkv1.0>)
- LUAR Project – Leading the University to the Distance Learning (<http://penta.ufrgs.br/edu/telelab/luar.htm>)
- Aprendiz Project (<http://www.uol.com.br/aprendiz/>)
- LED – Distance Teaching Laboratory (<http://www.led.ufsc.br>)
- S.A.B.E.R. Centre – Support to Learning Based on Remote Education (<http://www.centrodesaber.com.br/>)
- Telecourse 2000,
<http://www.bibvirt.futuro.usp.br/acervo/matdidat/tc2000/tc2000.html>
- Campus Global – PUCRS (<http://terra.cglobal.pucrs.br/>).

4.2.3 Courses via Internet

The remote courses offered in the Internet are completely remote. In order to participate in these courses students need to register; access is through a password. Not all courses offered in the Internet are free. The students' frequency is controlled. Communication between student and teachers is via E-mail, lists or chats. Not all have synchronous communication or student classes and they have a specific period to start.

Evaluation is based on the student's performance during the exercises and tasks required during the course and final exams. All offer certificates when the course's requirements are fulfilled. The following are examples of virtual courses in Brazil: Virtual Centre of Classic Studies (<http://www.centrovirtual.org/entrada.htm>), English Course – World On-line (<http://www.cultural.org.br/wol/>), *Surfing & Learning* (<http://cogear.uol.com.br/sal/>) and e-Courses on Movie Scripts (<http://www.conexao.net/>).

4.2.4 Virtual libraries

Virtual Libraries are characterised by the heavy quantity of information they offer in remote areas. They are composed of collections of articles and texts, links, books and manuals, magazines and newspapers, reports, events, projects, organisations, tools, remote courses, educational and research institutions, theses and essays, tutorials. They also have discussion lists, visiting register book and chat rooms. A search service is also offered, in order to facilitate the user's consultation.

5. FINAL COMMENTS

This paper reviewed the evolution and actual situation of computer usage in the Brazilian Education. We considered some historical aspects of technology, governmental policies that supported the introduction of computers in the schools and the evolution of the distance teaching. With the identification of the phases of computer usage in education we can notice that there are in Brazil schools in all levels of evolution, in other words, there are schools that have not started the use of computer not even in their administrative activities and, at the same time, there are schools that use the Internet in order to promote research, communication and cooperative work among students.

It is known that the computerisation process of education is slow compared to computerisation in other activity areas. This is because it involves a change of mind concerning the society's concepts and values, as new ways of thinking and acting emerge.

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BIOGRAPHY

Tiarajú Diverio is Professor and researcher of the Institute Computer Science at UFRGS. His areas of interest include Processing of High Performance and Informatics in Education.

Marcia Notare, Simone Mendes and Ingrid de Vargas Mito are graduates in Science Computer or in Mathematics at UFRGS and doing a Masters in Computer Science to the PPGC-UFRGS. Areas of interest include Artificial Intelligent, Agents, and Informatics in Education.