



# **TECHNOLOGIES IN THE CLASSROOM**

an experience in public high schools

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## FOREWORD

The most recent data on Brazilian upper secondary education disclosed that, in the last six years, there was an increase of about 118% in enrollments. Nonetheless, the performance indicators do not follow this trend, pointing to an urgent need for investment in policies and actions to improve the quality of education.

In 2001, UNESCO held, in Beijing, China, the International Meeting of Experts on General Secondary Education. One of the most important recommendations that resulted from this Meeting, was the need for governments to give high priority to this education level and at the same time, redefine their goals in light of the 21st Century's horizons.

This recommendation is in line with the recommendations from UNESCO's World Conference on Education for all, held in Jontiem in 1990 and from the Global Forum on Education, held in Dakar in 2000. According to these recommendations, it is not the enrollment of a certain part of the population, in other words access, that fulfils the right that all have to education. Education for All refers to an education capable of serving all children, youths and adults with the required quality and equity.

Improving the quality of education, keeping students in school and expanding access to education are among the major challenges currently faced by countries. Such challenges are associated to the increasingly important role played by education at a global level, because of its relevance to the pursuit of sustainable development in society, citizenship awareness building and the fight against social exclusion. The development of public policies based on those perspectives is a core strategy to ensure the universalization of access, attendance and learning at all stages of basic education.

The project *Technologies in classrooms to enhance learning and teaching processes*, developed in partnership with the Department of Secondary Education Policies of the Basic Education Secretariat, in the Brazilian Ministry of Education, tried to identify subsidies to support education managers in the formulation of policies and strategies of continuous and in service training to upper secondary education teachers in the public education system.

The three main achievements of the project were; to work with knowledge in an interdisciplinary way, in order to make comprehension of scientific and social phenomena as a whole possible, instead of it being fragmented and applicable to the current reality; provide teachers with the possibility of acting as more than mere knowledge transmitters, but to work in partnership with the pupils as the mediators in the building of knowledge; and finally, to use available technological resources in the school to make the teaching and learning processes more enjoyable and significant.

UNESCO Brasilia Office and the Ministry of Education would like to thank the State Education Secretaries in Piauí and Bahia, as well as all the educators who have participated in this project, committed to enhancing both equity and quality in education.



Vincent Defourny  
Director of  
UNESCO Office in Brazil *a.i.*



Francisco das Chagas Fernandes  
Secretary of Basic Education  
Ministry of Education

# TECHNOLOGIES IN THE CLASSROOM

AN EXPERIENCE IN UPPER SECONDARY EDUCATION SCHOOLS

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In a world where information and knowledge are accrued and circulate through increasingly sophisticated and powerful technological means, the role of school should be defined by its capacity of preparing the conscious, critical, active use of machines that accumulate information and knowledge (TEDESCO, 2004).

## INTRODUCTION

The importance and need for integrating technologies to school work, particularly new information and communication technologies, is clearly observed today. They are ever more present in everyday life, especially of youngsters. Moreover, the educators should foster their use in education, work and other relevant contexts within the scope of the school curriculum and its subjects.

We can find TV sets and radios in almost all of Brazilian homes. Computer is gaining space almost everywhere, in banks, supermarkets, movie theatres, stores, subways, buses, etc. However, public school fails in preparing the youngsters for a “conscious, critical and active” use and production of technologies.

But how could school train the youngsters, if the initial and continuous training of managers and teachers do not prepare them for that? How

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could teachers and principals expand the potential of their school work using technological resources if they hardly know their potentialities and limitations? Why, when and how could they be used to improve the teaching and learning process in a given matter, and jointly with other teachers in an interdisciplinary and contextualized way?

According to Tedesco,

the incorporation of new technologies to education should be considered part of a global strategy of education-oriented policies”, thus highlighting that “strategies should place priority on teachers”, considering that “new technologies change significantly the role played by teachers in the educational process, and that the existing research does not show clear ways to face the challenge of teachers’ training and performance in that new context (TEDESCO, 2004, p. 11).

Despite the existence of technological resources in Brazilian upper secondary education schools, they are hardly exploited in pedagogy, whether for the lack or inconsistency of permanent training processes or for the resistance to innovation by many teachers who, fearing the “new”, prefer to work with traditional educational methods, focused on transmitting content. School managers, in turn, barely know the technologies and their potential for supporting pedagogical activities.

In order to change that reality, and for believing in the use of technologies to foster the opening of new and different ways of producing and discovering knowledge (ALMEIDA, 2005, p. 42), UNESCO Brasilia Office and the Ministry of Education, through the Department of Secondary Education Policies of the Basic Education Secretariat developed, in 2005, the Project *Technologies in the classroom to enhance the learning and teaching processes*, aiming at:

- qualifying managers and teachers of State Public Secondary Schools in the selection and proper use of technologies to support the teaching and learning process;

- identifying subsidies to support the Ministry of Education and state managers in the formulation of continuous in service training policies and strategies for public upper secondary school teachers.

This article depicts some thoughts, findings and subsidies yielding from that experience of continuous in service training to managers and teachers developed in public upper secondary schools.

## PROFILE OVERVIEW OF THE PROJECT'S PARTICIPATING SCHOOLS

Initially, two States (Bahia and Piauí) have been selected based on the criteria of Human Development Index (HDI); age-grade displacement; night shift's enrollment rate; and agreement of the State Education Secretariats to participate and support the project's execution.

Then, each Education Secretariat appointed six schools. After applying the questionnaires to get acquainted with the conditions of the technology equipment and the didactic-pedagogical use of the existing resources, three schools were selected<sup>4</sup> in each State, and eight participants per school: The Principal, the Pedagogical or Technology Coordinator and six teachers, being two of each knowledge field (Languages and Code, Human and Natural Sciences and Mathematics), totalling 48 educators.

The six schools had the following characteristics:

- equipment such as TV, video recorder, computers working and connected to the Internet;
- equipment in satisfactory conditions of use, that teachers did not use frequently or used the Technologies inappropriately in pedagogical activities or were resistant in handling the equipment;
- teachers and managers interested and available to make the use of technologies dynamic and committed to planning and developing a

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4. Unidade Escolar Estado de São Paulo, Unidade Escolar Helvídio Nunes and Unidade Escolar Lourival Parente (Teresina/Piauí), Colégio Estadual Mário Augusto Teixeira de Freitas, Colégio Estadual Edvaldo Brandão and Colégio Estadual Luiz Pinto de Carvalho (Salvador/Bahia).

work plan, aiming at dissemination and capacity building of teachers at their school.

The analysis of the data collected in those six schools showed that: 50% of the teachers have never attended any training on the pedagogical use of technologies; about 50% have never used the computer/Internet in classroom activities; 70% have never participated in a discussion forum or chat; 34% barely know of the secondary education TV Escola programs<sup>5</sup>; 67% have seldom or never used those programs to support educational processes, while 33% had never developed interdisciplinary pedagogical projects integrating technologies.

The technological equipment available at schools (computers, TV sets, videocassette recorders, parabolic antennas) is purchased by the Ministry of Education and distributed to schools throughout the years without being upgraded or renewed. They receive poor maintenance and are now obsolete. Moreover, they could not be connected to Internet, thus hindering the planning and execution of pedagogical activities using such resources.

Other Latin American countries and even the United States experience a similar. Brunner presents some cases or situations to illustrate the so-called “effective use” of the digital means in school, highlighting Chile as a country where the use is “somewhat low among students, teachers and principals” (BRUNNER, 2004, p. 17). A study developed by the Department of Sociology from the University of Chile found out that “the use of new information and communication technologies in private schools is nothing but ‘simple’ for over 80% of the cases, where computer is used as a tool to carry out their daily activities, without taking more advantage of it to search, combine and analyze information in interdisciplinary teams”.

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5. TV Escola is a satellite-based TV channel exclusively devoted to education, launched all over Brazil on March 4, 1996. Its main objectives are: training, recycling, improving and appraising the public Fundamental and High School's teachers, and enriching the teaching-learning process.

According to studies carried out by Cuban the same situation is found in two high schools in an American (Silicon Valley), the first ranked in regards to the dissemination of New Information and Communication Technologies (NICT) in that country, where “teachers rarely use computers in the classroom and, even when they do, they continue their customary practices, with no substantial changes” (CUBAN apud BRUNNER, 2004, p. 67).

Therefore, Brunner concludes that “the advance to e-education does not depend exclusively on the schools’ equipment and connection, neither on a social context full of information technologies” (BRUNNER, 2004, p. 70), but also on more sophisticated and complex initiatives such as, for example, the teachers’ in service training to use technologies, effectively employing different means in the classroom and society.

A major challenge proposed by the Project was to contribute towards reversing that picture. Training a basic school’s team composed of managers and teachers and through multiplication be able to reach the other schools’ teams.

## **CONTINUOUS TRAINING OF TEAMS – THE DEVELOPED ACTION**

Technologies themselves cannot bring about any change in the pedagogical relationship. However, they could serve both for reinforcing a conservative educational model, as well as supporting a contextualized, interdisciplinary, interactive, cooperative and pleasant education. The capacity building and training courses were aimed at the reflection, understanding and assessment of the “place” they hold in each school’s context and their potential for the support of pedagogical activities.

To understand why and how technologies should be incorporated to the education process, teachers should have not only theoretical knowledge, but also technological competence to select and use them properly. If a teacher does not know the possibilities the Internet can offer, how could he or she provide guidance to students in search of

information to expand their studies about given issues related to the subject being taught? If he is not acquainted with a piece of education software, how can the educator suggest to his students its use?

An intense movement can be seen now among youngsters, producing photoblogs and blogs, which have become a space for communication and “social life” in effective virtual communities that bring them closer, establishing exchanges and affectional links. Many of these spaces are being used to advertise school productions. However, only a few teachers are aware of and understand their potential and limitations.

Thus, the gap that distances teachers and students in what concerns knowledge and use of technological resources is ever greater. This does not favour teachers or education. The experience developed a way of filling this gap.

The Project lasted ten months, with approximately 72 hours, integrating on-site and remote meetings.

The first on-site meeting took place in Brasília, lasting 24 hours. It placed priority on the reading work group for the discussion of topics on education technologies, analysis of educational videos, practical training on computers use (e-mail, Internet, registration in the Forum) and the outlining of a work plan to implement the Project in their schools, involving the training of other teachers in the use of technology in an interdisciplinary and contextualized way.

The second event lasted eight hours and was carried out in the States, integrating the other teachers and managers who had already been trained by the basic teams, and placing priority on the assessment and re-planning of actions, as well as on the disclosure of the findings of remote studies, like the analysis of educational software.

The remote meetings, supported by tutorials, were carried out by a virtual community created by UNESCO for that purpose. The main resources employed were a forum and chat room. The duration was of about 40 hours.

The remote activities resulted in the expansion of the theoretical knowledge and other issues discussed during the on-site meetings, relevant to the pedagogical projects support, planning and development teams. The exchange of experiences and information on the progress of the actions developed at each school; the recommendation of specific websites on the subjects and educational websites, texts, books to enrich the work, are a genuine cooperation network for teachers sharing the same interests and needs.

Considering that most of the participants (70%) had never used those resources, the communication through forums and chat rooms also allowed the development of technological competence. This was so because:

the teacher who associates the information and communications technology (ITC) to active learning methods, develops the technical skill related to technology mastering and, above all, articulates that mastering to the pedagogical practice and educational theories to assist in the reflection about the practice, changing it... (ALMEIDA, 2005, p. 72).

The two first months of the Project were devoted to the diagnosis and repair/replacement of computer lab and TV Escola equipment and to start training activities for remaining teachers. All schools have successfully changed the initial picture concerning physical space and equipment, improving them to develop pedagogical activities. In that sense, the Education Secretariat's participation was crucial to adjust/improve infrastructure.

The multiplication effect from the initial training of the 48 participants (teachers and managers) proved the feasibility of the strategy, considering that there was a 350% expansion of that number, as presented below:

### Number of participants in the Project execution

Schools	Trained teachers/managers <sup>a</sup>	Registered to the Forum <sup>b</sup>	Participation in projects <sup>c</sup>
1. Colégio Estadual Edvaldo Brandão/BAHIA	32	37	33
2. Colégio Estadual Luiz Pinto/BAHIA	28	26	24
3. Colégio Estadual Teixeira de Freitas/BAHIA	51	28	34
4. Unidade Escolar Helvídio Nunes/PIAUÍ	30	32	25
5. Unidade Escolar Lourival Parente /PIAUÍ	35	27	24
6. Unidade Escolar Estado de São Paulo/PIAUÍ	37	27	18
GRAND TOTAL	213	177	158

a. Trained teachers/managers: All those who participated in the training courses held at schools, and in the on-site meeting in the State.

b. Registered to the Forum: All those who registered to participate in the forum environment and exchange some sort of communication in that room.

c. Participation in projects: All those involved in the planning and execution of interdisciplinary projects at schools.

## HIGHLIGHTING OTHER RESULTS

The projects developed by the schools have shown that, despite the difficulties faced, school work may be enhanced by the use and creation of technological resources, which means that on top of being consumers, students and teachers may also be technology producers.

From the notice board to printed and virtual Newspaper; from Internet-based research; setting up or restructuring of the school radio; use of TV and videocassette recorders incorporated to the learning projects developed. The different technologies used contributed to foster and further the debate on the context being studied, and to strengthen team work, expanding the capacity of information search

and selection through the different resources used (newspapers, magazines, radio, films, TV, videos and Internet.)

However, as well as the use of existing technologies, students produced their own applications which played an important role in the development of competencies and building of interdisciplinary and contextualized knowledge, like:

- blogs – research and production based on the reading of literary work and other relevant topics;
- models – construction and photo exhibition, stands on the State's folklore, involving History and Geography contents;
- printed and virtual newspaper – produced with the teachers' participation in selecting the topics, limiting the boundaries of subjects, adjusting language and visual and graphic programming;
- maps, tables and demonstrative charts – produced using computer resources on the studies carried out;
- radio-school – constructing and/or restructuring, elaboration and development of its programming;
- photographic records of different aspects from the exploited contexts;
- school home pages, photoblogs, and blogs – building on themes studied and other relevant topics to students;
- project on the video *Ethics and Citizenship* – aimed at artistically restoring chairs;
- texts and poems – production of a compilation and parodies CD;
- discussion list – Physics and other topics relevant to the students of that subject;
- music compositions, movies and theatre approaching themes selected by students and teachers, and socialized with the entire school through exhibitions and shows.

Even if the use and application of technologies have not yet been incorporated by all students and teachers, the projects that use them have proved that such resources are important in taking the students from the condition of passive watchers and converting them into the main actor of the learning process, enhancing the meaning of what has been learned, and contextualizing the practice and theory studied.

## FAVORABLE AND LIMITING FACTORS OF THE EXPERIENCE

The processes of remote and on-site follow-up, as well as the assessments developed during the Project's execution, have disclosed some positive findings, but also some factors that have limited its development, as regards to the positive aspects:

- the nourishing environment in school, built by the teachers who were also being trained, was a strategy that fostered and strengthened a cooperation link among them. In most schools, it motivated the development of interdisciplinary projects;
- most schools have reported the occurrence of practices that were unusual up to that moment, such as arranging teachers meetings for planning, re-planning and assessment of actions;
- the teachers' participation in the Forum, contributing with their peers by suggesting websites, events, texts, during the pedagogical project execution. This enhanced their knowledge on the role and scope of technologies in the learning and teaching process.

“This forum is being a positive experience. I believe we need this: Try and do, because most of teacher training courses are concerned about transmitting contents and the teacher still has difficulties to put in practice the theories learned. When we learn like this, practicing, learning to do by doing, as proposed by the great master Paulo Freire, it is much easier to put theory into practice. This sort of experience makes us understand that many teachers

don't do because they don't know how, and not because of idleness, inertia, meanness or unwillingness" (Teacher).

- there was an increase of interest by students in carrying out the activities at the computer lab and video rooms. Since most of the students were from low-income families and could not buy books, they defended their right to use the computer room for research, as heard in this statement from a teacher:

"The students' participation in the activities proposed was much more effective, resulting in good performance and the students' personal development, as well as the integration among students and their peers, and the teaching staff as well. Moreover, they are more stimulated, participative and developed skills in virtual, oral and written communication" (Teacher).

- there was higher interest and motivation from students in the pedagogical activities developed using technologies. According to teachers, this contributed to the improvement of the learning performance, as seen in the following statement:

"We could notice that the pursuit for new methodologies for our classes has improved a lot our educational practice, while the contents delivered became more significant. That can be observed in the statements by the students, who used to say '– If I had watched the film, my grade would be higher', or 'that was great, teacher'".(Teacher)

- the mastering of technological resources allowed and increased the teachers' interest on Internet-based research, pursuing new kinds of knowledge to assist them in their in-class practice, as noticed in the following statement:

"... now I believe to have gone much farther, because I have acquired knowledge and, moreover, appraised even more my educational practice. The forum increased my enthusiasm mainly in regards to the use of computers, for example, which I really like". (Teacher)

- at different moments teachers have stated that the additional knowledge provided by the Project, and the opportunity of acting as core actors of an action that considers and is based on the reality of everyday school life, has assisted them in their in-class work, besides increasing their confidence, self-esteem and pleasure in working.
- changes on the concepts and practices of managers regarding the “place” occupied by technologies in the school environment and their role of fostering and articulating actions to ensure feasibility in the outlining of interdisciplinary projects, and those carried out by teachers in specific subjects.
- the technical, pedagogical and even emotional support granted by the tutor to teachers when discussing their doubts, fears and pleasures; suggesting topics and actions; articulating the interaction among them, have proved to be an important variable in the motivation, confidence and appraisal of teachers and managers.

However, it would be necessary to take into consideration some factors that have limited the full achievement of the project objectives, such as:

- during the Project, the initial diagnosis of the school status proved to be somehow disconnected to reality. Almost all schools faced connection problems and the labs were almost abandoned, with obsolete equipment that was poorly used. TV Escola was almost inexistent, since some of the recorded programs were oriented to the primary education and lower secondary education and not upper secondary education schools;
- the continuous and in service training process that associates capacity-building for mastering the use of technologies to improve pedagogical skills integrated to the curriculum, demands more time on behalf of teachers and managers, for its study and planning. This is especially so, in the case of the schools that have chosen to follow the methodology of projects;

- the double or triple working shifts of teachers who, to take part in their peers' capacity-building process and to execute the projects, many times had to use their leisure or family time. All that worsened by the lack of equipment and other technological resources that led teachers to, in joint work with the students, seek other possibilities out of school, for example, at the teachers' or students' house and in cyber cafe;
- the lack of knowledge by some school teams on the National Curriculum Law for Upper Secondary Education and other rules issued by the Ministry of Education have reduced the capacity of understanding an interdisciplinary and contextualized curriculum proposal;
- that has also hindered the school's autonomy and flexibility to organize school time and spaces, which are factors favorable to the development of the projects methodology;
- the limited mastering of computer technology hindered some teachers' participation in the Forum and Chat, demanding from the Project tutor more time to support the schools in developing technological competencies associated to pedagogical aspects;
- some schools lacked an expert to assist in the maintenance and some activities developed at the computer laboratory, thus hindering the Project's development. As an alternative, one of the schools sought the adherence of former students who have assisted, and even taken on the responsibility for running the laboratory. That strategy was further proposed by the Education Secretariat to remunerate the students in the way of a scholarship;
- lack of a person responsible for the TV Escola room has limited the access and use of the programs provided by the Ministry of Education but, on the other hand, as previously mentioned, led the teachers to seek alternatives to organize that space;
- low financial resources, ensuing difficulties to purchase materials

such as videocassette tapes, floppy disks, printer paper and others;

- lack of technical support by the Education Secretariat to teachers in what concerns the development of the pedagogical project, particularly in one of the States, thus jeopardizing the development of those actions scheduled by the schools;
- poor commitment and interest of some Principals along the project's execution;

Lessons learned in the formulation of continuous and in service training policies and strategies.

Both the favorable and the limiting aspects of the experience point out some subsidies, such as:

- continuous and in service training to enhance the use of educational technologies existing in schools. It should gather on-site and remote events, integrating Principals, Coordinators and teachers from different fields of knowledge. The experience proved that an on-site event held out of the school and in other State, and another at the schools, fosters and raises the value of teams;
- the remote events, through specific Forums, chatrooms and e-mails, are resources that go beyond a communication network. They have proved to be feasible resources, required to develop technological competencies regarding the exchange of experiences and ideas, seeking additional information sources, other than text books for the knowledge acquired during their training;
- initially to train a school team – Principals, Coordinators and teachers – so that this team may train other leaders and teachers. This has shown to yield favorable results. Team work provides more possibilities of developing interdisciplinary pedagogical actions, through integrated media. Capacity-building which is developed in the school environment, is oriented to the present, rather than to a distant future;

- the continuous training developed by the team allows the teachers to play different roles in the process – those in charge of planning, executing and assessing, jointly with coordinators of group activities jointly with other colleagues who are being trained. That fosters the participation, integration and cooperation among the teaching staff, because they are active players in the process of building the school project;
- the establishment of a specific Forum for teachers was an important tool that induced debates and socialization of experiences among teachers and managers of the same schools, and from other schools as well. They discussed problems, difficulties, and cooperation in the formulation and implementation of school projects. Moreover, the Forum is an important follow-up strategy, supporting teachers and allowing for the actions to be assessed by the tutors. It has also enabled teachers to have further understanding and confidence when using technologies in the school context and in its pedagogical use;
- the discussion and joint reflection on the problems, challenges, needs, limitations, and the search for alternatives by the group itself, allowed for a further understanding on the school role as a space for building knowledge, and on the co-responsibility of managers and teachers in the process of building attitudes and values among students;

In this regard, it would be worthy keeping in mind that the technological resources are ever more available to youngsters, where information freely circulates. Therefore, teachers and managers should be capable of preparing their students to the conscious and critical use of such resources and information. In that sense, all school stakeholders could and should be active players in the building of the pedagogical project, in order to strengthen the feeling of belonging to the school.

- Although some teachers hold technological knowledge they fail in employing it to enhance the teaching and learning process. Therefore, it would be of utmost relevance the simultaneous

acquisition of technical and pedagogical skills and competencies, in a proposal of continuous training to the teaching staff, Principals and Coordinators. Thus, the experience corroborates the principle according to which the technological and pedagogical mastering should be simultaneous processes.

- Finally, the participation of the State Education Secretariat, both for material and technical/pedagogical support, proved to be essential to support and raise the value of teachers in regards to the building and sustainability of the pedagogical projects developed.

## CONCLUSION

The strategies adopted to the continuous and in service training, gathering on-site and remote moments; simultaneous acquisition of technical and pedagogical competencies by teachers, Principals and Coordinators; on-site and remote tutorship; systematic follow-up to support the pedagogical demands and the continuous assessment of the ongoing activities, together with the performance of basic teams and the motivation of stakeholders, as well as the support of the State Education Secretariats through the Upper Secondary Education Coordination Units and Technology sectors (TV Escola and Computer Science) – have proved the Project's feasibility and achievements.

To Martínez, successful capacity-building should approach both technical and pedagogical characteristics, supported by advisory services and supervisions supportive of the teaching staff in the hard duty of changing their practice (MARTÍNEZ, 2004, p.105). This work was intensively carried out by the tutors and the Education Secretariats' experts.

It is worth mentioning that the Project's achievements also esteem from the working conditions built by the teachers during the its execution. The lack of better computers was duly compensated by the teachers using their personal equipment, many times supported by their family

members; many of the planning and capacity-building meetings took place only because of the teachers' good will in meeting at night or during the weekends. The issues related to equipment maintenance and organization of the use of computer labs were sometimes solved by students and former students.

Finally, it is worth mentioning that this experience proved and corroborated the feeling and proposals by many educators, according to whom, continuous and in service capacity-building cannot be disassociated from a set of factors such as: access to teaching materials and technological resources; school management; career development and remuneration plan; working hours; and systematic in service capacity-building programs. According to Campos, "the demands on education in terms of quality, efficacy and competitiveness are not always combined with resources, autonomy and structural changes in the educational systems or school culture" (CAMPOS, 2005, p. 9).

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