

# In technology training of science teachers: discussions of the teaching qualification.

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## Abstract

This article discusses data from a study with students of a Bachelor's Degree in Science, a public University of São Paulo, Brazil, offered in blended mode, in which the 2,835 hours of total working hours, 1470 hours are developed distance, through an online platform, called a virtual learning environment. It is considered important to reflect on the use of technology in the training of these future teachers in mind that this is necessary to go beyond the simple instrumental field of technology, and provide embedding them in a pedagogy that values, above all, the students and their projects, debate issues, promoting permanent critical attitude regarding the use of technological resources in the process of teaching and learning. For data collection was held record of participant observation and document analysis activities and course materials. The documents produced by the course as text, video classroom sessions and online activities and technologies are used as tools for learning and discussion about its importance in teaching and teaching practice are held mainly during classroom activities. The overall organization of the course, which involves weekly text, video lessons, classroom activities and online contributes to the teaching qualification. To experience teaching situations using the technologies as facilitators of learning, student teachers are more likely to learn, discuss, analyze and reflect on the contributions that have technological resources for teaching. Such experiences contribute significantly to the teaching.

**Keywords:** Teaching qualification; technology in teaching; science teaching.

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## Introduction

This article presents data from an investigation involving students of a Bachelor's Degree in Science, a public University of São Paulo State, Brazil, offered in blended mode. In this course, the 2835 hours of the total hours, 1470 hours are developed away, through an online platform, called a virtual learning environment (VLE). The blended model seeks to overcome the limitations of traditional classroom model, breaking barriers related to time and space, linking geographically distant people and contributing to the provision of higher education with quality, flexible and more personalized.

According to Valente (1993), the semi-distance education is a hybrid form of education, which are associated with the main assumptions of distance education (DE), such as autonomy, collaborative learning, virtual learning communities, to face modality.

Students that participate in a blended degree course need to use technology very effectively during their initial training, as teachers and students are not physically present in the same space, but interact through video conferences, chats, online activities. Thus, both the teaching and learning in distance education acquire different characteristics because now considered to be individual cases and, at the same time, collective, dialogic and autonomous (Palloff; PRATT, 2002), requiring of teachers planning and a posture differentiated, that considers how to teach and how to evaluate.

Therefore, it is important to reflect on the use of technology in the training of these future teachers in mind that this is necessary to go beyond the simple instrumental field of technology, and provide the incorporation of them into a pedagogy that values, above all, the students and their projects, debate issues, promoting permanent critical attitude regarding the use of technological resources in the process of teaching and learning. Moreover, the growing supply of semi-presential courses and distance education (DE), mainly for teacher training also brings another need: to verify how those students who have computers as the main tool in its own process learning, will be able to integrate technology in making daily, to incorporate diverse educational practices, attractive and in keeping with the era experienced technology. Agreeing with Valente (1993), computers must be part of the school environment, and teaching it is to know the educational potential of technology, adopting methodologies that create conditions for students to interact and build knowledge.

Teacher training is a process that begins with the initial formation and extends throughout the profession in a common mechanism of continuing education, but it will be from the initial university education that will outline profile management technologies, that is, this first step needs to provide

a foundation for the construction of continual learning that is to be enhanced and incorporated throughout the teaching profession. It is necessary to investigate how this foundation is being built in semi-distance courses for where the technologies are available, the better that teachers are able to integrate them into education and which do not exist, the better they are prepared for incorporation them when they arrive and use what is available for the benefit of their students.

It is considered essential that teachers are provided opportunity to master the use of different technologies, so they can adapt such technologies to the educational context; without being carried away by technological fads, but to understand them as a teaching tool in the construction of knowledge, always reflecting on its possibilities. Therefore, it is necessary to evaluate the initial training developed in a blended course develops this teaching preparation. Such an evaluation could contribute to the improvement of this and other initial training courses.

## Methodology

Data was collected from document analysis and participant observation (BOGDAN & BIKLEN, 1994), during the 2012-2015 academic year, a total of seven semesters of classes, two classes of students of the blended Bachelor's Degree at a public university the state of São Paulo, Brazil. The research involved direct observation of situations, and search for interpretations of observed situations were systematically recorded in field diaries for further analysis from a qualitative approach, therefore, the teaching activities developed by teachers and tutors were observed. The discussion of the data included the references on teacher training and distance education.

## Theoretical foundation

It is considered essential that, during initial training, opportunities are given for the use of various technologies in individual or in groups, going beyond the mere use of the machine, or that such use occurs only because it is a blended course. We need to involve undergraduates in analysis of any difficulties that have to develop a teaching job with the help of technology, and have to experience enriching experiences for their own training. This may contribute to, to get to school, the teachers do not feel very far from his students that, whatever the social level, have great familiarity with computers and other equipment.

According to Coscarelli (2002), the success of new technologies as an educational resource depends on the use that is made of it. The revolution will not come from the machine, but of ideas and practices that it can enable. So, to turn that computer teaching practice is necessary that the educators who will use this equipment have in mind a new school, otherwise

the computer will only repeat the traditional practices of teaching and learning. This new school of design to be discussed during the initial training, through reflection mechanisms of action and reflection in action (Schön and Costa, 2000).

Thus, information and communication technologies must be used for the development of activities that emphasize the collective production because a semi-distance education, where a part is developed to distance should not be a solitary education, however, the tools and technological resources may approach the students and teachers responsible for these disciplines. Such activities will help to educate the subjects of this process on their autonomy and would combine and practice.

In this conception, training involves how to think about the necessary conditions for possible interventions where doing and redoing would be constant, a mechanism that can facilitate the construction of new knowledge about the pedagogical practice, both students and teachers. Therefore, this research proposal from the beginning was based on educational theories that presuppose practices that enhance the cooperative relationship, understood as all those in which there is no preponderance of one element relative to others, based on reflection about doing on practice together the theory and the own training and knowledge that is built for it. For this, online and classroom spaces should enhance mutual respect, collaborative relationship, respect for freedom and autonomy among students and between teachers and students.

To experience situations of cooperation and to the construction of learning, teaching future is more likely to put it into practice in your daily make. This also occurs with the use of technology in education, if they learn to use them only as tools, possibly will do so in their practices, so the full potential of technology cannot be wasted using only traditional repeat activities, copying and other little value. We agree with Parolin (2005, p.14) that students need "a template as a starting point" to be able to imitate, hear, see and discuss to learn: "Learning begins in interpersonal, i.e., the established relationships and ends at the intrapersonal, the subjectivities and the syntheses that the learner can do."

To Coscarelli (2002), a distance learning course requires the student among other things, a lot of discipline and autonomy of learning, but we are accustomed to a dictatorial school system, authoritarian, in which individual initiatives are not valued and that autonomy is not developed or appreciated. When the student has to organize his time to study, to carry out an activity or discipline himself to participate in online discussions, learn to exercise his autonomy.

In this context, it is undeniable that the use of different technologies promotes greater flexibility and multiple forms of interactions and exchanges of knowledge, valuing different skills and respecting rhythms of learning. While in traditional education must all learn the same thing, and at the same time,

within the same space, in distance education each student will make your time in areas that it deems appropriate. We start this assumption, this experience can contribute to this future teacher appreciate a more flexible education that respects the diversity of the students, their spaces and learning rhythms.

According to Perrenoud (2000, p. 128), "form for new technologies is to form the judgment, critical thinking, (...) reading and analysis of texts and images, the representation of networks, procedures and strategies communication. "the teacher training for the use of ICT should cover therefore aspects related to attitudes, values and skills before the flexible and adaptive professional profile and teaching activity inserted in the era of media and multimedia.

According to Valente (1993), teacher training for the use of new technologies goes beyond simply providing knowledge about computers, but implies teaching process to create conditions for the active appropriation of concepts, skills and attitudes, which makes sense as the discussed contents have relationship with the pedagogical objectives and the social, cultural and professional background of their students.

Still for Valente (1993), the computer must be part of the school environment, and teaching it is to know the educational potential of the computer, adopting methodologies that create conditions for students to interact and build knowledge.

Veiga and Fonseca (2001), argue that to introduce computers in schools, it is necessary to have a pedagogical plan, which are outlined the objectives of its use as a teaching tool, and emphasizes the need for well-trained teachers, qualified and available to face this new challenge to the use of information in motivating and teaching activities that can reinforce learning of the proposed curriculum concepts. This preparation begins in undergraduate programs, which need to recognize the importance of the experiences nurtured during initial training.

## Results and discussion

The analysis of the documents which constituted the course, especially the pedagogical project, indicated great concern to promote a formation that was not understood as a superposition of two sets of knowledge, in which the learning of disciplinary knowledge precedes the learning of pedagogical knowledge, promoting the formation of a teacher not only endowed with skills in their area of knowledge, but also able to understand the diversity of the population served today by the Brazilian basic school.

Thus, these documents propose that the content linked to specific and linked to vocational training teacher training should enrich each other, not observed fact in the proposed material for classroom and online activities as well as during the conduct of subjects and conducting activities-. What happens in

practice is a job with specific contents Sciences area during the first three modules, and only the third module to introduce a pedagogical discipline, not happening connection with specific subjects previously worked. Thus, it can be considered a focus on specific disciplines of content, such as biology, chemistry, physics, mathematics, among others, and such contents are shown disconnected from discussions on the didactic resources to teach or how to teach them, for example.

The documents produced by the course as text, video classroom and online activities and technologies are used as tools for learning and discussion about its importance in teaching and teaching practice are held mainly during classroom activities.

The teaching plans of the disciplines that make up the course were analyzed. Such documents are available to students through the Virtual Learning Environment (VLE) within each discipline. They are plans describing the syllabus of the subjects, but do not reveal the concern to ensure a pedagogical field of technology. Of the 52 courses offered by the course, can be identified in 04 plans, objectives in item or program, the indication of a job that values discussions on the pedagogical use of ICT, for example: Subject: Science, Applied Science and Technology (offered for students enrolled in the third year): indicates one of the goals: "to analyze and discuss the educational implications of technology as a producer of knowledge area and its potential as a possible reference of knowledge and skills to teach."

However, the vast majority of subjects that make up the course does not present evidence about the pedagogical use of technology discussions. Moreover, statements in the document is not a guarantee that the work will be done. For this to occur, online or in-person discussions must involve moments of reflection on the incorporation of technology in day-to-day school. However, discussions of disciplines emphasize learning difficulties specific content. In practice, it was observed that the tutors, due to lots of activities to correct or questions to answer or lack of ability, end up limiting offered help only to remedy conceptual questions of the students.

The online material available in AVA, reveals that the disciplines, both specific to the teaching, consist of an adequate theoretical basis, present great amount of physical content, Mathematics and Biology, but little link between theory and practice. I.e., the content is very detailed and thorough, but discussions on how to teach them and how technology can be used for teaching and learning are absent. The reviews, which occur in person and are mandatory, as well as evaluation activities in the virtual learning environment, have the same approach as the issues value knowledge on the content and not on how to teach it.

The video lessons of the course, mostly follow a traditional model of education in which the teacher

sets out the content and the student listens passively. Questions should be posted by the student forums, chats or sent by e-mail, which must be answered in no more than 48 hours. The use of interactive tools such as forums, allows virtual interaction between students and teachers, allowing flexibility in the hours of study. However, if not properly used, can undermine student achievement, as well as the construction of their autonomy, for example, the presentation of specific questions that do not allow the exchange of information and views.

Of the many advantages that can be cited of distance education are; that the students receive almost individualized teaching, besides the great interaction between those involved in the process, students and teachers, exchange information and engage in discussions through e-mails or in social networking on the content of the subjects.

The semi-distance education requires more than a change of the physical environment, but also a change in the use of the technologies involved, to streamline the education and contribute to the pedagogical training of teachers with regard to the use of new technologies. For teacher education to contribute to the formation of an attitude of "learning to learn", the activities need to provide greater exchange of information and views, spaces to answer questions and reflections on problems with the contents worked.

There was frequent interaction between the students and their teachers throughout the course, mainly through electronic messages. In these messages the students they sent questions and doubts about the disciplines, requesting guidelines for activities resolution, —sent work for correction. Teachers as well as answer any questions, send several directions, both on the course and on the course.

The learning in the distance education system can be considered an individual process and the same collective time, dialogic and autonomous (PALLOFF; PRATT, 2002), this feature prints the need for a procedural assessment and nonpoint, and may the online environment, provide control journal academic development of students. Distance learning must involve a progressive evaluation process, where all the time should perform the evaluation, always with a view to diagnose faults, observe student performance, thus enhancing other evaluative instruments not only a proof (PINTO, 2009). In this sense, tools such as chat rooms, mailing lists and essay questions, interactive forums and activities among others, existing in the course can contribute to the evaluation process.

In addition to the regular tests carried out in person, they are also evaluated tasks, quizzes and/or delivered online reports or as classroom activities. Contribute to the monitoring of learning and academic progress of students and allow for teacher feedback by returning the activity of correction, setting up a continuous evaluation, procedural and mediator.

During the discussions classroom activities were observed on the use of technology in teaching. Teachers used videos, simulations, games, not only for the explanation of specific concepts of disciplines, times when it was possible to record comments from students about understanding certain processes, but also to illustrate activities that a teacher who teaches science can accomplish in education Basic to promote understanding of a concept, phenomenon or visualization of a structure. In one class, for example, the teacher stated: "I selected this video to illustrate to you how does the fertilization of an egg. As it is a good teaching video you could even use with students of you." In these moments the students wrote down the references of videos or indicate interest in using them.

The general organization of the course, which involves weekly text, video lessons, classroom activities and online contributes to the teaching qualification. Mores (2013) points out that DL, intermediated by technology, offers features that promote significant advances in the process of teaching and learning. Instruments and digital tools when used properly, together with their applications in learning and teaching, promote changes in the culture of the students, helping to make them autonomous, participative and members of the digital culture. It was observed that autonomy is constructed gradually by students from year to year and iteration with teachers and technologies used in the course.

Thus, the mixed online and in person, present this course, i.e. the interaction and complementation of the two models (blended learning), is configured as a proposal to increase the chances of success of teaching and learning process. The practical focus, observed systematically proved here valid and effective, and the use of ICT tools. In the same way, the mixture of both models, such as the use of multimedia resources in the classroom sessions (use of multimedia projector to present situations, events or locations distant from the reality of students), as well as the use of descriptions of experiences of students in online activities, are good examples of instructive character and facilitator for learners. didactic/pedagogical mediations such as the distance education mode, possible by the use of systems such as VLE (Virtual Learning Environments), and ICT (Information and Communication Technologies) have the possibility to expand the time and space of teaching and learning (SOEK & HARACEMIV, 2008). Thus, the proposed innovations by type of education and guided learning in distance education has the promise of being overweight for the contemporary world increasingly dependent on digital world. The opportunities offered by distance education where the student and the teacher develop activities in spaces and different times have the promise to be a relevant type of education for the global and lacking modern society opportunities to obtain education in a way that need to spend a lot of

time their lives and careers, and typically associated with the presence model.

It is possible to infer, after systematic monitoring of various groups of students of the course, that the teaching process has been proven effective in the sense that online activities and employed in person the language and behaviour of students in all years evaluated question will show significantly changed. Learners gradually begin to take positions in the classroom, in dialogues in person or online, and even reports about their behaviour in their workplaces (be they in the teaching job or not), or their remarkably modified family and social gatherings. They begin to use closer languages that used in the gym to do and demonstrate fluent use of the knowledge acquired.

### Considerations

To experience teaching situations using the technologies as facilitators of learning, future teachers are more likely to learn, discuss, analyze and reflect on the contributions that technological resources have for teaching. Such experiences contribute significantly to the teaching qualification.

The semi-distance education is a new educational model that imposes challenges to be overcome. One is to ensure teacher training that favours, not only a theoretical background from the specific disciplines, but also moments of reflection about what the teacher does in order to avoid the dichotomy between theory and practice and to promote a greater exchange of ideas and reflection on how to teach using ICT, an important educational tool.

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