Artigo

Degree in Mathematics in Distance learning modality: a study on the use of software in Supervised Practice

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ABSTRACT

This paper is part of a research which results present an analysis on the use of software in Supervised Practice in Distance Education course (DE). The Academic participants of this research belong to the first class of Mathematics course in Distance Education, at a public institution bounded to Open University of Brazil (UAB). The class began the course in the second half of 2008 and finished in the first half of 2012. The information was collected through questionnaires taken by teachers to four learning centres of the course. The analysis were based on studies by Valente (2011) and Papert (2008), about the use of computers in education approaches, pointing to evidence of little usage of softwares in Supervised Practice. The low percentage of students who mentioned the use of software may be related to the use approach.

Keywords - Teacher Training; Software; Supervised Practice; Distance Education.

RESUMEN

Este artículo es el recorte de una investigación, cuyos resultados presentan un análisis sobre el uso de *software* en la Pasantía Supervisada en un curso en la modalidad de Educación a Distancia (EaD). Los académicos participantes de la investigación forman parte del primer grupo de un curso de Licenciatura en Matemática en EaD, ofrecido en una institución pública vinculada al sistema Universidad Abierta de Brasil (UAB). El grupo inició el curso en el segundo semestre del año de 2008 y finalizó en el primer semestre del año de 2012. Las informaciones fueron colectadas por medio de cuestionarios llevados por los profesores a cuatro polos del curso. Los análisis fueron fundamentados en los estudios de Valente (2011) y de Papert (2008), sobre los abordajes para el uso de computadores en la educación, apuntando indicios de poco uso de *software* en la Pasantía Supervisada. El bajo porcentaje de académicos que citaron la utilización de *software* puede estar relacionado con el abordaje de uso.

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Palabras clave – Formación de Profesores; *Software*; Pasantía Supervisada; Educación a Distancia.

RESUMO

Este artigo é o recorte de uma pesquisa, cujos resultados apresentam uma análise sobre o uso de *softwares* no Estágio Supervisionado em um curso na modalidade de Educação a Distância (EaD). Os acadêmicos participantes da pesquisa fazem parte da primeira turma de um curso de Licenciatura em Matemática em EaD, oferecido em uma instituição pública vinculada ao sistema Universidade Aberta do Brasil (UAB). A turma iniciou o curso no segundo semestre do ano de 2008 e finalizou no primeiro semestre do ano de 2012. As informações foram coletadas por meio de questionários levados pelos professores a quatro polos do curso. As análises foram fundamentadas nos estudos de Valente (2011) e de Papert (2008), sobre as abordagens para o uso de computadores na educação, apontando indícios de pouco uso de *softwares* no Estágio Supervisionado. O baixo percentual de acadêmicos que citaram a utilização de *software* pode estar relacionada à abordagem de uso.

Palavras-chave – Formação de Professores; *Softwares*; Estágio Supervisionado; Educação a Distância.

INTRODUCTION

Differently of the existing controversy in the past decade, the distance education modality in higher education is currently the most accepted one among people in Brazil. This change may be associated with the large increase in the supply of higher education in this modality. There are many universities that offer courses at distance, especially after the establishment of the UAB system in 2006.

Mathematics course, in Distance Education, was offered initially in Brazil, by CEDERJ, which is an association of six public universities of Rio de Janeiro. Currently, thirty-seven public institutions (institutes and universities) offer, through this modality, Mathematics course.

In this paper it will be discussed the basic teacher training use of digital technologies, from the analysis of information about how the academics of a Bachelor's Degree in Mathematics use such tool, offered in distance education modality on Supervised Practice.

Data was collected through questionnaires with academic students from such course, tutors (classroom and distance ones) and teachers of subjects who act in the course. Also, there are data from interviews with the coordinators from the course. The examined group started out the course in the second half of 2008 and finished in the first half of 2012. Academic students are from four learning centres of UAB, Mato Grosso do Sul (MS). From forty-three students enrolled in the final course level, from learning centres belonging to the MS, thirty-three (76,74%) answered the questionnaire. Responses from thirteen teachers, one classroom tutor and four distance tutors were either used, resulting eighteen questionnaires in total. Next, we are going to start the discussion on teacher training and the use of technology.

1. TEACHERS TRAINING AND APPROACHES TO COMPUTER USAGE

Teachers training course in recent years, has been the subject of much research since, with each passing day, the requirements are increasing due to various transformations, caused by technological advances.

In the light of this changing context and new demands on learning, changes do not just concern on adoption of diverse methods, but the attitude towards knowledge and learning, as well as a new being, world and society conception. This implies that the teacher will have different roles to play, to act where this is required, which new ways of training are necessary to prepare them for the pedagogical use of computer (ALMEIDA, 2000, p. 11).

The author, for over a decade, called attention to the need for training to prepare teachers to use, pedagogically, the computer in their practices, that is, to an attitude of integration of these technologies into lessons. Bittar (2011) states that integrate the computer involves use it so that it will contribute to student learning, improving a better understanding of the concepts involved in the studied content.

This integration is not only related to the design of software use. Almeida and Valente (2011, p. 8) claim that "more than the underlying thought of the creators of certain educational software conceptions, it is the activity with its use that explicit pedagogical approach that sustains it". The author explains that to use the technologies in order to contribute to learning not only just a concept, but the action that characterizes an approach to use.

Papert (2008) presents two approaches to the use of computers in education: instructionism and constructionism. The instructional approach focuses on the amount of information offered to students, as it believes that the more information available to the student more opportunities to learn. The computer is viewed as a machine that teaches, and second Goulart (2009, p. 39). "[...] In instructionism the teacher does something to the learner, he is in charge and has an active role, leaving to the student a passive role of knowledge consumer".

Constructionism comes from that learning design advocated by Piaget's constructivism, however, with the use of the computer. In this approach, the student is encouraged to learn by practice, or learn to do by doing. Therefore, situations of interest to students are created, letting them involved and it leads the students to feel motivated to learn (VALENTE, 2002). In this approach, the computer is seen as a machine to be taught, and the interaction that occurs between the student and the computer helps in manipulation of concepts, contributing to the mental development of the student (VALENTE, 1998).

This approach allows the student to be active in their learning process, in other words, the student is encouraged to seek answers to their questions, being asked all the time about their conclusions. Thus, it is led to understand that learning depends on them, and not the information provided by the teacher, being able to develop his autonomy.

Returning to the topic about teacher training, Viel (2011, p. 12) states that:

> [...] Education should provide full and complete formation for the being, form critical, conscious and free individuals, allowing them contact with new technologies, this way they would not lose the dimension of technological development that currently elapses the country.

The teachers training, aiming the integration of digital technologies in the teacher's pedagogic practice, needs "[...] to provide conditions for the graduating student be able to develop critical and reflexively own style of working with technology" (ALMEIDA, 2002, p. 3). However, this self-styled need to be guided by principles of an approach that will bring contributions to the process of building the student's knowledge.

As previously stated, the constructionist approach is the one that offers greater possibilities to assist in the process of knowledge construction. If we expect that our future teachers to work in this approach, it is necessary to provide training that also shows such models.

One of the most important requirement for initial teachers graduation education is on CNE/CP 1 Resolution, from February 18th, 2002, which establishes "[...] the use of information technology and communication and methodologies, strategies and innovative material support" (BRAZIL, 2002, p. 1). It is also emphasized that there must be "[...] coherence between the training offered and the expected practice of future teachers [...]" (BRAZIL, 2002, p. 2). That is, there is really no need to expect that the practice of academic student, future teacher, be focused on the use of technologies, if they do not experience this practice in their training.

According Goulart (2009, p. 185), two factors are important and essential to think about the formation of teacher towards to the use of digital technologies: "[...] the experience of this integration in their own learning, construction of knowledge, in the context of their own disciplines; understanding why and how to integrate the computer into their teaching practice in all its complexity". Therefore, the teacher, in training, will understand in practice how to integrate it in their classes at school.

This experience must occur in all disciplines of a course of initial teacher training, including components as the Teaching Practice and Supervised Practice.

2. DIGITAL TECHNOLOGIES AND THE SUPERVISED PRACTICE IN TEACHING

Supervised Practice is one of the basic requirements in initial teacher training. Four hundred hours of compulsory Practice are required to be performed in the case of Mathematics degree in the final years of elementary school and high school. This workload can be reduced depending on the academic performance, ie, if the academic teaches for more than two years, will have to comply 250 hours only, and if has taught for over five years, will have to perform 200 hours, as described in CNE/CP 02/2002.

According to Scherer (2011, p. 168), "[...] the purpose of the Supervised Practice is to enable that the academic, future teachers [...], try, experience, learn in action, giving rise to theories studied or study, their profession [...]". And Pires (2011, p. 78) states that:

> In curricular practice activities and supervised practice, the future teacher needs to have opportunities to perceive personality, skills, talents, disabilities from other teachers and start to think about on his own personality, skills, talents, disabilities.

Therefore, the supervised training is fundamental to the academic professional life, future math teacher, need to be supervised, because the lack of specialized monitoring in stages in education can lead to "[...] the psychological death of student at school" (SCHERER, 2011, p. 170). To this end, academic students need to be monitored and guided to prepare themselves and thus meet the current requirements of education, including the use of digital technologies to provide learning processes.

The importance of the use of digital technologies in teacher education, we present then, the software that have been used in the curricular components of Practice Teaching and Supervised Practice on Mathematics degree course offered in the form of distance education, focus of analysis of the research here presented.

The use of digital technologies is provided in the pedagogical design of the course for all disciplines, as seen below:

> It is intended that the development of all disciplines of the course must work all fundamental aspects for the Mathematics teachers training, such as: historical evolution of concepts, treatment of different levels of argument, use of information technologies, context and questioning (IES, 2009, p. 25. Emphasis added).

These presented as fundamental aspects in the design of course, are necessary for the training of teachers of the XXI century. When questioned about the use of ICT, foreseen in the project of course, the coordinator who started the course (COORD. A), said:

> [...] Four or five learning centres, we made early on. I have been to the learning centres work a little the question about the student "Opening the Computer", if knows how to read e-mails, do the basic things for the course and distance education and, along with that, we worked some mathematical software, some programs, then, they did it before the course starts. If I'm not mistaken, we couldn't offer it, in three learning centres, because all pcs had linux installed, you can imagine all the mess... Then, in the end, it didn't happen. It happened during the classes. So most of the disciplines we had to go to the lab, this time we did it like that: so, if I'm working function, we go to the lab, see the graphs . We could do it, using the instruments and used the computer too (COORD. A, emphasis added).

In this talk, we notice that the initial coordinator of the course proposed actions to insert the computer in class. This attitude may be related to what Bittar (2011) discusses about the action of inserting the computer practice wherever the teacher proposes. "[...] make use of this instrument [...] in situations disconnected from classroom work" (BITTAR, 2011, p. 159) and adds that this happens quite often, when teachers use the computer lab with their students.

What Bittar (2011, p. 159) presents as important to the learning process, it is the

integration of digital technology, so "[...] to allow them to understand, access, explore different aspects of knowledge on the scene". Referenced in Bittar (2011), we can infer that at the beginning of the course, the actions performed favored the inclusion of ICT in the course activities.

Almeida (2000) states that, quite often, the introduction of computers made this way does not allow "the opportunity to analyze the difficulties and the potential for its use in pedagogical practice. And very least, perform cleansings and reflections of this new practice" (ALMEIDA, 2000, p. 45). Which, according to the author, they are very important moments in the training of future teacher who will work with digital technologies.

Continuing the search about understanding how the software has been used by teachers in Supervised Practice and Practices in Teaching, the current coordinator of the course (COORD. B) said:

> [...] It is aiming its use in all [subjects], but it is useless to advise whether the person had no such training [...] some other teachers do it naturally, others not, then it is sometimes difficult for me to have a team, for example, I have a team working with linear algebra, or VAG [Vectors and Analytic Geometry], and then we indicate the use of Geogebra. We show it, propose the activity, play the recordings, but if it's easy for me the usage of the software, I use it in my way, but if you've never dealt with it, you listen to everything I say and you suddenly get to your class and shows there the topic, give some examples about vectors and stuff, and think you used ... so it's different. Each teacher ... it depends on their training [...] (COORD. B, Emphasis added).

In this speech, we notice that the initial coordinator of the course proposed actions to insert the computer in class. This attitude may be related to what Bittar (2011) discusses about the action of inserting the computer in practice when teacher proposes "[...] usage of this tool [...] in situations disconnected from classroom" (BITTAR, 2011, p. 159) and he still adds that this happens quite often, when teachers use the computer lab with their students.

Bittar (2011, p. 159) presents as important step to the process of student learning is the integration of digital technology, so "[...] to allow it to understand, access, explore different aspects of knowledge on the scene". Referenced on Bittar (2011), we can infer that at the beginning of the course, the actions performed favored the inclusion of ICT in the course activities.

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Following the search for understanding on how the software has been used by teachers in Supervised Training and Practices in Teaching, the current coordinator of the course (COORD. B) said:

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In this speech, it is evident that the Coord. B understands the influence of teacher education on their teaching practice. Having this knowledge is important, and based on such thought, we can bring Goulart (2009, p. 118.):

> [...] The usage of the computer by the trainer into processes of teaching and learning, is influenced by their knowledge and expertise, and that knowledge of these influences can make important contributions to the development of a training proposal [...].

Thus, the teacher trainer is responsible not only for the training of academic students, but also by their own training, as this will influence on the course, and consequently on the academics who will be future teachers and, likewise, influence the others. Following the search for achieving the goal proposed in this paper, we present its use that has been made in the Supervised Practice and Teaching Training.

The academic students from this course presented some information regarding the use of ICT, which were used during the Supervised Practice, as shown in Table 1.

Table 1 - ICT used in Supervised Practice, according to the academic course. IES - 2011

Tecnologias	Amount of academic students
Internet	12
Did not answer / do not remember	10
Geogebra	10
Superlogo	9
Editors	7
Calculators	3
Cabri Géomètre	3
Educational Games	2
Spreedsheets	1
Aplusix	1
Not specified	1

Source: Survey data

The digital technology most used in training, according to the students, is the internet, which was not remembered by all. Then we can point that, because this deals with Distance Learning, internet is essential to do or send out the activities and even with this, some students did not mention its usage. Important fact to mention is that the use of mathematical software such as Geogebra was cited by 10 academics and SuperLogo by nine academic research participants. Apart from these ones, were also mentioned Cabri Geometre by three academics and Aplusix by only one academic student.

We also sought information on the questionnaires by teachers and tutors. Of these ones, three teachers also taught these areas. The teacher who taught such area, at the learning centre I [3], mentioned mathematical software Graphmática, SuperLogo, Geogebra and Aplusix as used in the development of their classes; the teacher who taught this area at the learning centre II, mentioned the usage of Geogebra, Winplot Poly softwares; the teacher from learning centre III, said he used the Geogebra, Graphmática, GrafEq Poly softwares during the course. The teacher who taught this subject at the learning centre IV [4], did not respond to the questionnaire.

Observing the responses of the students, again, we noticed that those who attend learning centre I mentioned the GeoGebra, Cabri Geometre, Aplusix and SuperLogo software. Although the number of students who mentioned the use of software is low, it is noticed that the information presented of this area at this learning centre, diverging only in the sense that the teacher mentioned Graphmática, instead Cabri Geometre software presented by the students. Despite this divergence, it is possible to see that this area, at such learning centre had the usage of software in its development.

Academic students from Learning centre II mentioned the usage of Geogebra software during the classes, which had been mentioned by the teacher; however, they mentioned that, the use of Cabri Geometre and SuperLogo, not mentioned by the teacher. In contrast, the teacher said he used Geogebra, Winplot and Poly software, which were forgotten by the students.

At learning centre III, six (of fourteen) academic students who responded the survey mentioned Geogebra software, whose teacher who taught the discipline at the learning centre, had confirmed its usage. But five students mentioned SuperLogo which was not mentioned by the teacher. Students have not showed evidence of the use of Graphmática, Poly and GrafEq softwares which had been mentioned by the teacher.

At learning centre IV, although nine students have responded to the questionnaire, none of them mentioned the use of software in the practice area. Teachers who responded to the questionnaire, none manifested as these teachers in this polo. As any student mentioned the use of softwareduring the practice, it is possible that at this learning centre any software has been used.

Practices for Teaching Mathematics are offered throughout all four years of the course. According to the design of the course, during the four years, the use of new technologies are proposed and in the third year, software analysis (IES, 2009) is added. To suggest the use of software in these areas, students presented the following data:

[3] For ethical issues, the four learning centers of MS will be identified as learning centre I, II, III and IV.
[4] It is noteworthy that, in the investigated, course teachers of the subjects are not the same at all centers.

Table 2 - ICT used in the discipline of Practice on Teaching Mathematics and Instrumentation for Research, according to the of Mathematics students. IES - 2011

Technologies	Amount of academic students
Did not answer	17
Internet	16
Calculator	5
Editors	4
Superlogo	2
Cabri Géomètre	2
Geogebra	2
GrafEq	2
Winplot	2
Videos	1
Not specified	1

Source: Survey data

Most students did not remember or left this question blank. The internet was the most used digital technology in this area, in which sixteen of the thirty-three students mentioned its use. However, the specific software that can assist in building and understanding of mathematical concepts, were seldom mentioned. It is not enough for an area that, as the course design, it proposes the use of ICT in all levels of basic education as well as the analysis of software and computer resources.

The information contained in the teachers questionnaires, shows that eight of them also taught this subject in one or more years' course, and presented himself as a distance tutor from the discipline of practice IV. This tutor has made reference only to the use of resources available in the Virtual Environment during the course, and the other teachers presented a few softwares.

Teachers who taught such area, at the learning centre I, stated to have used during the course, mathematical software such as Régua e Compasso, Poly, Graphmática, SuperLogo, Geogebra, Aplusix and Cabri Geometre, however, only one of the students mentioned the use of educational softwares during the course of this area, without specifying which one would be. This lack of memory of the use of software by the students in the course of teaching practices, can give evidence that only the teacher used the software during class, no letting students put "hands-on".

Teachers who worked in the area at learning centre II, said they used Geogebra, Poly, and Cabri Geometre software to develop their lessons , however, the students said they used the SuperLogo, Cabri Geometre, GeoGebra, and GrafEq Winplot software.

Although teachers who taught in this subject at polo III have stated that during the course, they used Geogebra, Poly, Cabri Geometre, Régua e Compasso and Graphmática software, and to notice the students questionnaires from this learning centre, it is possible realize that none of them mentions the use of software during the course. Such information gives evidence that the use of this software may have been performed only by teachers, which indicates an instructional approach (PAPERT, 2008).

Teachers who taught this area, at the IV learning centre, said they had used Graphmática, SuperLogo, Geogebra, Aplusix and Régua e Compasso softwares. But, none of the students from this learning centre mentioned some software in development of this discipline.

As we observed, only learning centre I presented evidences of use of the software development of Teaching Practice, which is a direct link with the Supervised Practice. Although the design of the course provides the use and analysis of software and computer resources, it is possible to infer that this proposal began to be experienced with the first class of Bachelor's Degree in Mathematics, and the data from this research can help to keep up thinking about how to further integrate digital technologies in the initial training of these teachers. Considering that the course is in distance education, future teachers should be even closer to the possibilities of teaching and learning using digital technologies, after all, these are part of its actions as students of a course in this modality.

FINAL CONSIDERATIONS

The initial teachers training is an issue that still needs to be thoroughly discussed, especially when it is performed in distance education modality. As observed by the data presented in this paper, there is evidence of use of software in Supervised Practice, but not in all centers where the course is offered. The fact that not all students mention the use of software may be related to the approach, although instructional, the use of computers, that inserts the software that do not favor the construction of knowledge by the student.

With the view of initial training brings influences on the pedagogical practices of students, future teachers, we need to continue investing in an initial teacher education in distance education modality. What is sought are formations that integrate digital technologies into their teaching actions, favoring the learning of mathematical concepts and pedagogical use of these math classes in basic education.

REFERENCES

ALMEIDA, M. E. B.; VALENTE, J. A. **Tecnologias e currículo**: trajetórias convergentes ou divergentes? São Paulo: Paulus, 2011.

ALMEIDA, M. E. B. **Informática e formação de professores**. Brasília: Ministério da Educação, 2000. Disponível em: <http://www.miniweb.com.br/atualidade/Tecnologia/Artigos/colecao_proinfo/livro09_informatica.pdf >. Acesso em: 5 set. de 2014.

_____. Formação de professores para inserção do computador na escola: inter-relações entre percepções evidenciadas pelo uso do software CHIC. **Educação, Matemática e Pesquisa**, São Paulo, v. 4, n. 2, 2002. Disponível em: <http://math.unipa.it/~grim/asi/asi_03_bianconcini.pdf>. Acesso em: 1 abr. 2012.

BITTAR, M. A abordagem instrumental para o estudo da integração da tecnologia na prática pedagógica do professor de matemática. **Educar em Revista**, Curitiba, v. 1, p. 157-171, 2011.

BRASIL. Conselho Nacional de Educação. Resolução CNE/CP nº 1, de 18 de fevereiro de 2002. Diretrizes para a formação inicial de professores de educação básica, em cursos de nível superior. **Diário Oficial da União**, Brasília, 9 abr. 2002.

GOULART, M. B. **A formação de formadores e a integração do computador na licenciatura em Matemática**. 2009. 205 f.

Tese (Doutorado em Educação) – Universidade Federal do Paraná, Curitiba, 2009.

PAPERT, S. **A máquina das crianças**: repensando a escola na era da informática. Porto Alegre: Artmed, 2008.

PIRES, C. M. C. Reflexões sobre o Estágio Supervisionado a partir da implementação de um curso de licenciatura em Matemática, na modalidade Educação a Distância. **Perspectivas da Educação Matemática**, Campo Grande, v. 4, 2011.

SCHERER, S. Estágio Supervisionado e a atitude do orientador: planejando aulas de Matemática para ambientes informatizados. **Perspectivas da Educação Matemática**, Campo Grande, v. 4, 2011.

Projeto Político do Curso de Licenciatura em Matemática (PPC). Modalidade de Educação a Distância. Campo Grande, 2009.

VALENTE, J. A. Educação a distância: criando abordagens educacionais que possibilitam a construção de conhecimento. In: ARANTES, V. A. *et al.* **Educação a distância**: pontos e contrapontos. São Paulo: Summus, 2011.

_____. A educação a distância possibilitando a formação do professor com base no ciclo da prática pedagógica. In: MORAES, M. C. **Educação a distância**: fundamentos e práticas. Campinas: Unicamp/Nied, 2002. p. 27-50.

_____. Por que o computador na educação. In: _____. (Org.). **Computadores e conhecimento**: repensando a educação. 2. ed. Campinas: Unicamp, 1998. p. 29-53.

VIEL, S. R. **Um olhar sobre a formação de professores de Matemática a distância**: o caso do CEDERJ/UAB. 2011. 219 f. Tese (Doutorado em Educação) – Universidade Estadual Paulista Júlio de Mesquita Filho, Rio Claro, 2011.