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THE APLICATION OF GEOGEBRA ON DISTANCE LEARNING MODE

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ABSTRACT

This paper aims to report the pedagogical practice applied to students of higher education in the form of the Distance Learning Course in Mathematics from the Universidade Aberta do Brasil- UAB and the Universidade Federal Rural do Semi-árido - UFERSA. In carrying out this work were developed content related to Introduction of Linear Algebra using mathematical software GeoGebra as a teaching tool. In this, sequences were developed from the principle of teaching of didactics of distance education. To do so, we note the importance of new technologies, in which the software Geogebra applies, thus allowing the student a real vision of what is been studying and arousing interest in learning mathematical content.

Keywords: GeoGebra. DE. Higher Education. Tools.

INTRODUCTION

The distance education, according to some researchers, has existed from the eighteenth century. And despite not being the most effective form of teaching today, the same is seen as a major breakthrough in the democratization of education-learning and intellectual development of individuals in a society, since it provides the easiest and most comprehensive form of access to teaching.

Currently more than 80 countries on five continents, adopt distance education (DE) in all levels of education, using the formal and informal systems, serving millions of students (NUNES, 1993, 1994).

The DE has been widely used for training and development professionals from diverse fields such as: security; health; education; etc. This occurs both by private enterprise and by government. May notice that today there is a growing number of institutions and companies

that develop human resource training through DE mode. It is worth noting that this process occurs mainly due to changes in the organization of production, which can be determined primarily due to increased market competitiveness, besides new requirements in terms of quality by consumers, this has caused companies to seek a workforce increasingly qualified (KOVÁCS; CASTILLO, 1998).

Throughout the 90s, this type of education in Brazil, has aroused the most varied discussions, especially on the inclusion of the same in the country. Can be seen clearly that such discussions have taken shelter in various segments, especially in the educational and commercial area.

Within this perspective, it's noticed the divergence of thoughts in society about the subject. Such thoughts are assigned to distance education: chance, recommended / non-recommended, acceptance/ disapproval, fear, doubt, among others. In this context I believe that distance education (DE) can be presented as both a solution and a problem. It is believed that reflection to broaden the discussion of scientific theories in distance education is needed now.

In the current scenario education or distance learning is a very relevant topic, since its origin is linked to the relationship between man and the environment they live. This in turn always seeking betterment and improvements in their learning. Education should provide the way to follow in a complex world and constantly agitated, where changes are frequent and knowledge increasingly "perishable", most of the time, the knowledge acquired in early life is not enough to supply individuals indefinitely. (VALLEY JUNIOR; BARRETO; MEDEIROS, 2010).

There are basically three components needed in education: the teacher, the learner and the content, but for learning to happen both in the model classroom education or distance, should be encouraged in these components at least four pillars of the knowledge that the report of UNESCO (1999) are defined as: learning to know, learning to do, learning to live together and learning to be. It is important the teacher stimulate, and the student continues, education and free time to enjoy the joys of knowledge, individual research, intellectual curiosity, critical thinking and discernment, so that teaching and learning does not happen only at times when the student is in the classroom, but that goes beyond time and space and

the young pass to pay more attention to things and people, stimulating combination of deduction and induction as research methods.

In several areas, cognitive knowledge must be connected to personal competence, to the know-how to be able to act on the environment in which the individual lives, however this practice needs to be pegged to the knowledge of live together with others. Thus, assumes that education has the task not only to convey information about human diversity but to get people to understand that are needs of each one figures out how to live with these differences as a point in favor of human development, to the increasing of creativity and generation of new ideas. In DE this knowledge and make living together becomes an even greater challenge, but the technology helps, in that it can also be used to bring people together, teachers should be aware emphasizing tasks in groups.

According to the Brazilian Association of Distance Education (Associação Brasileira de Educação a Distância – ABED), from 2000 to 2008, the increase in the number of students who use this modality is immense, the growth was 45.000%. (MARTINS, MOÇO, 2009) Despite this expansion, there are still doubts about this modality. According to the sense of Higher Education from 2010, released in October 2011 this type of education continues an upward trend, increasing 14.6% compared to the sense of 2009. (BRASIL, 2011).

When it comes to distance education arise many ideas, however certain meanings given to this mode are not suitable, there are many questions to be answered about this topic. According to Moore and Kearsley (2008), the fundamental concept of distance education is linked to the issue in which teacher and student are separated by distance or even, in some cases by time.

The expansion of this modality happened in a very eclectic way, as the same has been provided through various resources, Moore and Kearsley (2008) present five generations of DE: The first generation refers to communication through correspondence, the second through transmission of radio and television, the third generation is distinguished by mode of organization of education at open universities; Already the fourth generation, between the 1980s, with the innovative group interaction in real time on distance, are the teleconferences; Finally, the present generation that involves teaching and learning online, in virtual universities, through the internet / web.

It is salutary to understand the university as a space for research, analysis, discussion, reflection, systematization and critics of human knowledge, it still racing the role of causing the interrelationship between theory and practice of knowledge abstracted from this distinction. It is not conceivable, therefore, the university as a producer of closed knowledge or subservient to the market.

Rapid access to information technologies has provided significant changes in the way we live, work, and organize socially. Today people are communicating more frequently despite being in different locations, near or far away.

In this sense Kenski (2009, p.29) states that “these new technological possibilities not only change our everyday lives. So widespread, they change all our actions, able to think and represent reality and, specifically, in the particular case of education, the way of working in activities related to school education”.

Thus, the educational space is transformed by the digital revolution, which, in earlier times, the educational environment was located in space and time. An interesting fact about the interactive technology is that the internet it’s used as the main vehicle of instruction in a little over 93% of undergraduate and postgraduate courses. As the use of online videos represented by more than 57% of IES (MARTINS; MOÇO, 2009). This shows that interactive technology is critical to the interactive process between students and teachers.

In this sense it is the use of Geogebra software is used in distance education as a support for the teaching and learning process of the student. Thus this research aims to describe teaching practices carried out with students of higher education in the form of the Distance Learning Course in Mathematics from the Universidade Aberta do BrasilUAB and the Universidade Federal Rural do Semi-árido – UFERSA, being possible to verify that the software comes to collaborate with the teaching and learning of students in the exact sciences.

METHODOLOGICAL PROCEDURES

The case study presented here was developed in mathematics courses offered in distance modality from the Universidade Aberta do Brasil- UAB and the Universidade Federal Rural do Semi-árido – UFERSA during the first half of 2012. 2, on classes of Introduction to Linear Algebra. Was made to choose the pole where it should work the

mentoring. Before the beginning of the course, we had a pedagogical week, where tutors responsible for the discipline addressed some points to be worked. With that we realize the importance of using new technological resources as a tool to aid teaching and learning.

For the beginning of the course we had a live class, which defined the pragmatic contents of the discipline and presentation of the Geogebra software, where everyone unanimously already knew the tool. But, even with all the knowledge we aim to show its desktop, knowing its toolbar and how easy it is to use the resources in the construction of points, lines, graphing equations and others.

Thus, for the teaching of algebra does not become just a roundup of formulas to be decorated, the teacher had intended to bring the student to realize that the same situation can then be solved using different representations, analytic and geometric, according to their characteristics in the mathematics' study.

Education has always been a complex process that uses the intercession of some medias, as accessory or supporting to the teacher's action in their interaction with students. Using a virtual environment with the provision of chats and forums is proposed activities for the student to use the tool so that it will identify and recognize what is being proposed with the activity.

RESULTS

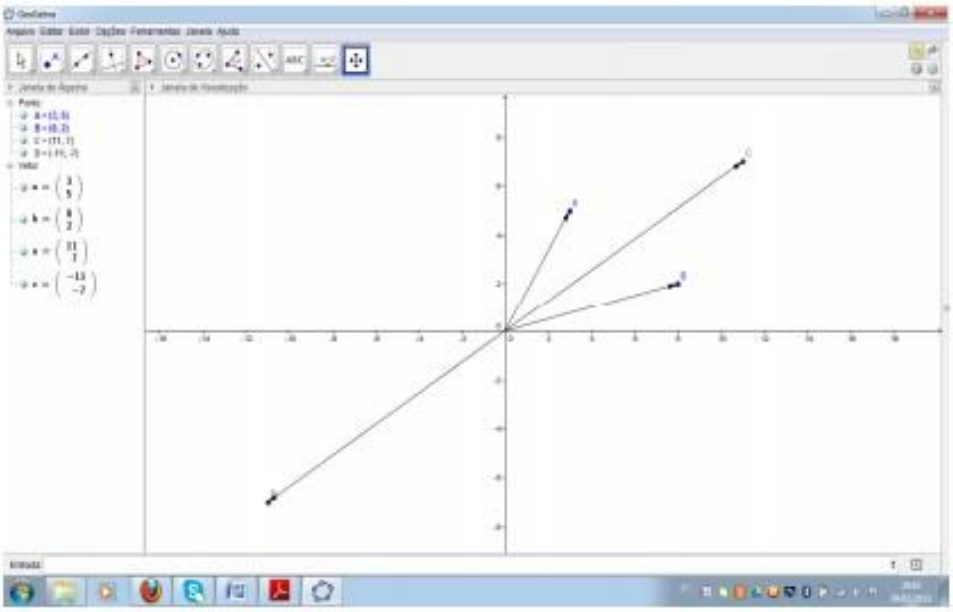
During this teaching practice, we develop a job with the Introduction to Linear Algebra with vectors, vector spaces, linear combinations and linear transformations. First time a study is made on the issues and knowing the two properties and axioms. Done that, we left for the use of Information Technologies and Communication - ICT - opens possibilities for acquiring information increasing thereby the conditions of knowledge elaboration. Traditional sources of information are no less important or reduced, but happens to be linked to the use of technological resources, aiming at facilitating and effectiveness of the teaching-learning (ALBUQUERQUE, 2011).

Used as a teaching tool the mathematical software Geogebra , by being a free software and found on it features of geometry, algebra and calculus . One of the advantages of using Geogebra in this work, is given by it to represent the vectors analytically and geometrically ,

with their usual operations. According to figure 1, we use Geogebra as a way to identify a vector space. Aiming at the student's participation in the virtual environment always looking for student-teacher interaction, teacherstudent through forums and chats, the students are asked to build in the software some examples that we showed in the operations such as: the sum of two vectors, a multiplication of a scalar by a vector, a multiplication of a scalar zero by a vector, the multiplication of a scalar opposite each other by a vector. It is true that, at first some students had some difficulty due to detachment of the pole or even the internet network available.

This activity was intended to open dialogue about the definitions of a vector space, thus showing their axioms of addition and multiplication by scalar

Figure 1 – Representation of the usual operations in Geogebra software

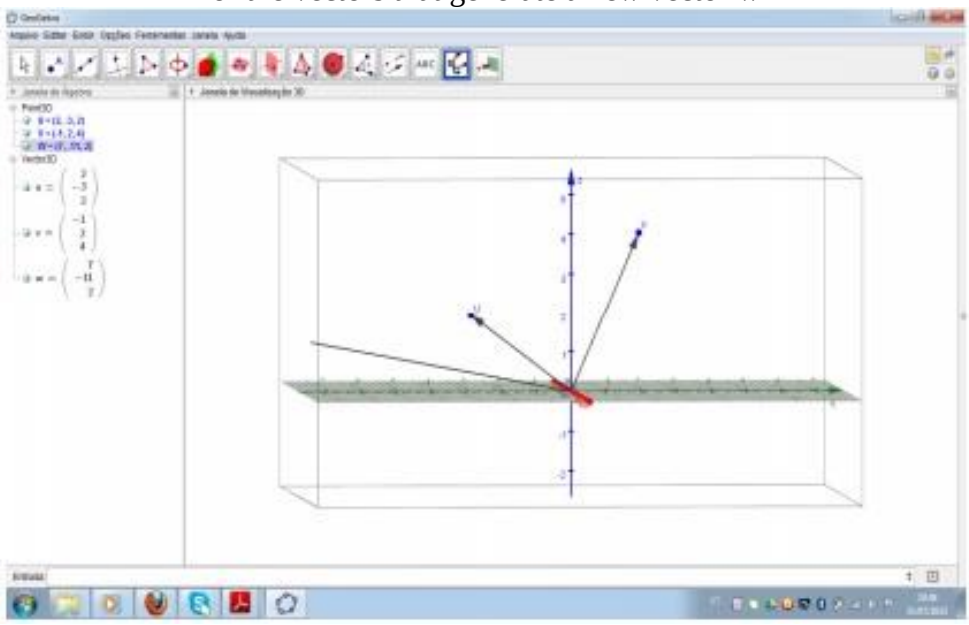


Source: Window of Geogebra software

These representations show us the importance of new technologies in mathematics' teaching and specifically in Linear Algebra. In Figure 2, was proposed in the virtual environment forum to resolve issues involving the linear combination of vectors and at in end represent its solution in the software, thus showing the construction of its geometrically solution. A very important feature in Geogebra, is a three-dimensional representation of its plan. This representation is only found in version 5.0 Beta. This view becomes much more

attractive for the students than just a drawing on the whiteboard in order that the plan rotates three-dimensionally.

Figure 2 – Representation of the linear combination
of the vectors that generate a new vector w

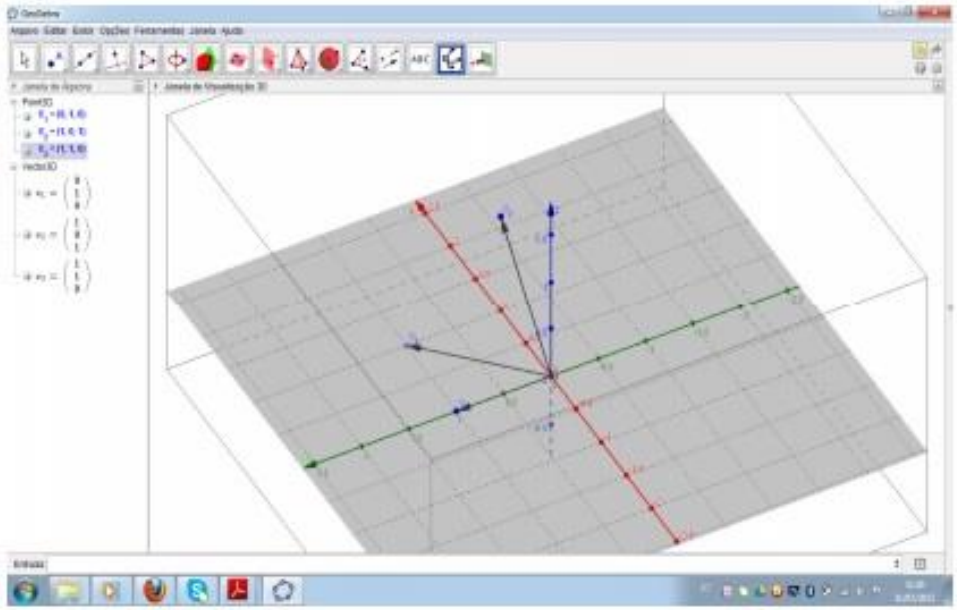


Source: Window of Geogebra software.

During this activity, there were some difficulties of handling the space R^3, but the situation was circumvented, through them, giving tips on how to use and even forming study groups. With this, the student is led to a process of exploration along with the demand for his explanation and implementation of the same. Bringing the discussion board his opinion of what was built. Students realized that by changing dynamics of the scalar they were able to visualize various combinations and observe its properties.

In figure 3, where we consider one of the most difficult points to be worked only with the resolution of issues is the linear transformation. The Geogebra gave us a simpler way for the student to try to understand the meaning of this transformation. Again we propose to solve a problem about the content to being worked, where it would be necessary to make the linear transformation of the space R^3 to R^2. At first, we ask them to seek the view of the basis of this vector space R^3.

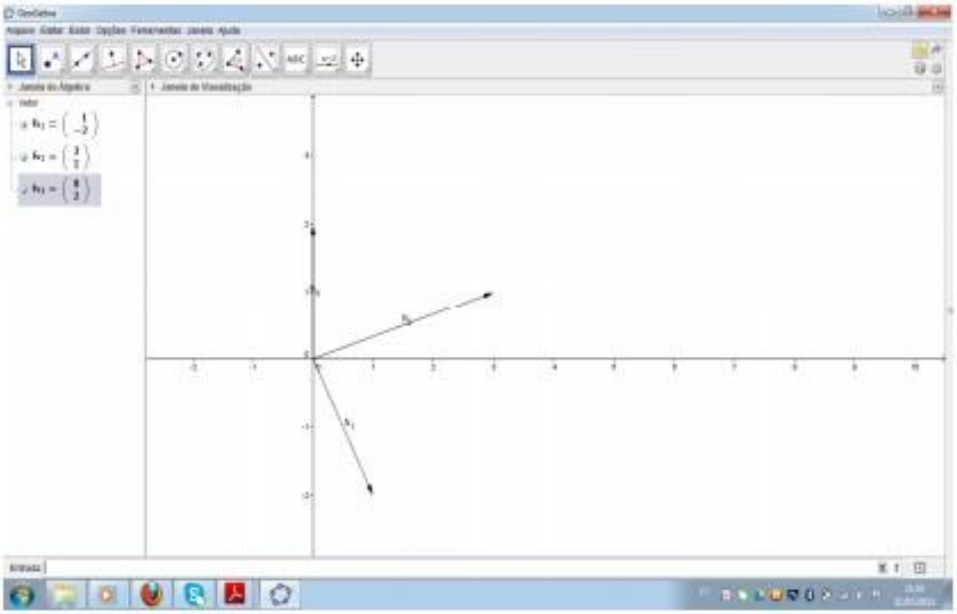
Figure 3 – Shows the plane of R^3



Source: Window of Geogebra software.

In a second step, the student should determine the analytical resolution of the problem, thus verifying its geometric solution. The question was intended to view the vector space R^2 as a solution of the problem. At this point for the teacher, Geogebra provides situations that come to contemplate the teaching, it can convey what the teacher needs to the student so that he understands what is been working to contribute to distance learning.

Figure 4 – Shows a linear transformation from R^3 to R^2



Source: Window of Geogebra software.

In figure 3 and 4, students were able to verify and determine the linear transformation from R^3 to R^2 observing their properties. This view of the result awakens on the student the curiosity to find new solutions. On Geogebra it becomes much easier to understand, making clear the importance of software as a learning tool.

FINAL CONSIDERATIONS

The lived experience during teaching practice, reported here, allowed us to reflect on the meaning and importance of planning when resources to be used are the new technologies. This study shows us an experience, quite enriching for the teacher and the student bringing a very positive experience using Geogebra. The introduction of ICTs helped awaken the motivation to learn, interest and taste for the subject Introduction to Linear Algebra.

The Geogebra software was well chosen for the study of vector spaces, linear combinations and linear transformations. Students had the opportunity to meet the Geogebra software and with this tool the opportunity to construct their own knowledge on an enriching way. With the introduction of ICTs in DE teaching the teacher's role is modified, thus, starts to play the role of counselor, mediator, researcher.

The teacher is no longer someone who owns and transmits knowledge but he assists in learning knowledge. Moreover, with this work we verify that the new technologies, including Geogebra software, allows the student to arouse curiosity and interest to learn mathematical content. The use of ICTs in an Introduction to Linear Algebra was of great value to the students, especially by Geogebra in the learning process.

So it becomes challenging for the teacher to use these strategies for teaching DE, improving the performance and the result. Thus, GeoGebra will be able to foster the development of attitudes, learning and taste for Linear Algebra.

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