POTENCIALIZE-SE: A VIRTUAL GAME OF MATHEMATICS

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ABSTRACT: Currently, it is impossible to think about a modern society dissociated from innovations that have emerged in recent decades. This continuous process of development makes many new devices arise as many become obsolete. This new dynamic brings constant changes, so the school, as integral and fundamental part of this process, needs more than ever to draw its attention to the development of computer technology. Therefore, this project aims to contribute to these many changes, developing a technological tool that helps in the learning process of mathematics and that encourages the students to break with the stagnation of learning basically in the classroom. It also intends to facilitate and offer to the teachers a tool to contribute to the improvement of the classes. The project is the development of a virtual game named "Potencialize-se" which is divided into eight stages'. The contents of the game have been chosen by six students of the 2nd year of the integrated course in Computer Science under the guidance of a teacher of mathematics based on the fundamental prerequisites for a high school diploma to be granted.

Keywords: Mathematics, Computing, Education.

INTRODUCTION

The millennial development of mathematics, its mechanisms, systems and algorithms always quested overall results i.e not based on particular cases. Therefore, the development of a tool to assist in this search quickly and effectively has always been a desire. Then comes the computing. The substantial development of computing technics starts with the search of Alan Turing for a theoretical device to respond to a challenge from the famous mathematician David Hilbert. In this context, it is possible to observe the interactions in the development of Mathematics and Computing. Based on this strong relationship between these two areas of knowledge, mathematics education can get many benefits of information technology with the use of websites, software and applications developed specifically for this purpose. The Brazilian National Curriculum Parameters (PCN's) suggests the use of computers as an important manner to combat school failure and to assist in the understanding of the meanings and relationships between objects and mathematical concepts. Therefore, it is necessary that more and more students have a solid training whatever the school level is in order to the computer technology to continue to develop continuously. According to Ponte and Canavarro (1997) "computers bring new opportunities for mathematics, mathematics is also what makes them incredibly effective (...) Computing and mathematics combination is a powerful system that produces results that could not be figured out sometime ago. Ponte and Canavarro (1997) pointed out "important indications for the use of computational tools in the teaching-learning process." In Brazil, information technology in education emerged in some Universities in the early 1970. In the 1980s, there was a significant increase in the area, including the digital inclusion in primary schools. However, according to Valente and Almeida (2007), "Computing in Education area has not yet penetrated the ideas of educators and therefore is not consolidated in our educational system." The question that arises is why the Brazilian schools have so many difficulties to use computing for educational purposes in a reasonable way and seems to beagainst this trend of society as a whole? Also according to Valente and Almeida (2007), insufficient

funds injection and poor background of teachers are some of the possible causes for this situation. It is necessary, then, according to the authors, a transformation in teachers training Last names of the authors in the order as on the paper as well as innovative projects in the area so that full advantage of the educational possibilities that computing offers can be taken. In this context, this project aims to:

- Build a game related to mathematics education to support the teaching and learning process.
- Encourage the students to break with the stagnation of learning process, which is basically performed in the classroom.
- Enhance the development of mathematics skills.
- Offer to the teachers a tool that can contribute to the improvement of their classes.

METHODS

The project is being developed at Escola Técnica Santa Cruz (ETESC), under the guidance of a teacher of mathematics. The project, according to Jonassen classification (1996), has as its focus in the learning process by using technology (learning by) which the student programs the computer. The other focus is learning with technology (learning with) in which technological resources are used as cognitive tools in the development of knowledge. In this category, what is fundamental is not the technology itself, but how to use and hold this technology. Still, the other two categories: learning from the technology (learning from) which the student only receives the knowledge that is shown and learning about technology (learning about) which technology is the learning object that can be contemplated at some stage of project development. The main concerns of everyone involved in the development of the project have always been the following ones: the development of a game that make it possible to present a dynamic approach to mathematics, that the player may have the opportunity to test his knowledge by solving significant problems and the player may have the opportunity to clarify any doubts related to the topic. The subjects were selected taking into account the fundamental basic mathematics contents that are important prerequisites for both the development of other mathematical topics and other disciplines. The sequence has been defined in this way in order to tell a story in which the player is about to finish elementary school cycle and intends to organize a celebration trip and a party. The player will pass through eight scenarios that include the party organization with specific budget graduation, space planning where the party will take place, estimation of food and drink for the guests and the purchase of all required materials for the party and for the trip. For each scenario of the script, dynamic and meaningful activities were prepared. At the end of the each scenario the player is informed if the results are achieved or if revision of the content is necessary. Up to the moment, the web site where the game will be hosted has already been developed and the first scenario of the game has been fully completed, ie the script with the theoretical activities as well as the computer programming. Tests have been carried out and everything is working perfectly. As soon as the game development is completed, a short tutorial to help teachers and students will be drawn up. The next step will be a wide dissemination of the game for the teachers, especially the mathematics ones, and for students. The disclosure will include motivation workshops. The materials needed for the project development are quite simple ones: computers with internet access, paper and printing. All these needs are being supplied by ETESC.

RESULTS AND FINDINGS

According D'Ambósio (2003) it is of utmost importance "that students do not label mathematics as a set finished knowledge and techniques. Therefore it is essential to modify teaching methods that do not stimulate participation." Thus, as soon as the game construction is finalized, it is expected significant internalization of computing in Mathematics learning process. It is also expected greater interest in the discipline inside and outside the classroom. Moreover, the purpose of this project is to bring together tools that increase the possibility of testing results and data manipulation by the students. The idea behind is that students will become more and more autonomous in the learning process as long as they will be able to develop by themselves various problem-solving strategies that will stimulate a critical analysis of the results. This proposal provides for the students a perspective that goes beyond the classroom as it opens the possibility of using resources that can be accessed from anywhere and at any time. The quick and efficient manipulation of objects allows the development of a new vision, new ideas and new theories. Up to the moment, the web site where the game will be hosted has already been developed and the first scenario of the game has been fully completed and tested. Students are working to finalize the remaining stages of the game. These stages probably will be developed faster than the first one. Many items developed for the first scenario might be utilized in the other phases as well as some time consuming bugs can be avoided.

CONCLUSION

After the project being presented to reviewers students, all of them rely that the project as a feasible alternative to improve the teaching-learning process of mathematics. The construction of the game, including the ones,

which are fully concluded, and the ones that are under development, have been carefully figured out in order to the students involved to participate intensively as central actors rather than supporting the process. The students have internalized this responsibility and are working extremely hard not to expiry the proposed deadlines. The students are often offering new ideas and alternatives to improve all stages of the processes. They are working on a collaboratively way and eager to advance with the construction of the remaining scenarios of the game. The development of the project made it clear that the use of technological resources facilitates the connection of mathematics with practical everyday problems and increases the interest in mathematics by the students. Several times, the working meetings to discuss a topic related to the game became a class on mathematics curiosities or even deepened discussions on mathematics topics. The whole process of preparing this first stage of the game lasted three months. This period, from the selection of the students who would participate in the project till the end result was extremely positive for the teaching practice. It was very interesting to define with students the issues to be discussed in the project. However, sometimes, different points of view concerning the development of the project or some specific topic were pointed out. The students not always agreed with the mentoring teacher and vice versa. Such situation has made the mentoring teacher to adopt a different approach. Instead of a simple explanation about the mathematics topics, it was necessary to invite experts in specifics topics for them to give their contribution to the project. Therefore, teacher had to understand the real needs and difficulties of students with regard to some topics related to mathematics. In this way, several times the teaching practice has been reinvented. Another interesting fact is that the knowledge of the mentoring teacher of the project on computing programming is limited. In many cases, as far as the computing programming is concerned, the students played the role of the teacher. This new format helps both the teacher to listen to the students and they are more comfortable while working. The result is product of a fully cooperative process, equally built by teacher and students. The project confirms the importance of developing scientific research in basic school. During the steps already developed, the benefits are many. Among them, we can mention: the teacher is improving the teaching skills and the students are fully involved with mathematics learnship. In any case, the commitment of each and everyone involved, regardless teacher or student, in addition to the positive results up to the moment is an extremely pleasurable and interesting experience.

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