Computers in Teaching-Learning of Physics Discipline: Investigating Different Methodologies

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Abstract
Nowadays, the use of the computer science is an unquestionable fact in all sections of our society. In the last years, in Brazil, some public and private incentives have been permitting to take for some teaching institutions a little of this reality. Therefore what we can question today is not if the computer has out not to enter schools, since this is unavoidable but how technology has to be incorporated to the school context in order to provide the learning process and universalization of knowledge. In this sense, a great deal still needs to be developed and investigated in way to guarantee that the new technologies do not just arrive at schools, but that they are appropriately used in classroom. This article shows the results obtained in a research work that had for objective to evaluate the use of different methodologies and resources in teaching learning in physics discipline.

Keywords: learning process, educational softwares, Physics.

1. INTRODUCTION

Today, technology invades great space of our quotidian. Different from this reality it is in most of Brazilian schools, which should offer to students the use of computers as one more didactic-pedagogic resource, exploring its advantages in order to enrich the educational process.

There are incentives but for that it happens, there is much to be done for new technologies be appropriately developed and used in classroom. So, this article presents a research work, that has as main objective develop an educational software for teaching-learning contents of Physics and to evaluate its use in classroom, looking for question the different methodologies used in Physics teaching, its pedagogical inferences, its didactic resources, as well as, its implications in its use, as on students’ part as on teacher’s part.

In section 2 we discuss the teaching-learning process of Physics and the experimental method; in section 3 we present the proposed software; in section 4 it is described the methodology used for the software evaluation in classroom and, finally, in section 5 we report some results and conclusions.

2. TEACHING-LEARNING OF PHYSICS DISCIPLINE

On research results, published by Yager [4], it is verified by didactic investigation that certain number of students disinterest themselves for Physics discipline (and other sciences) during the schooling period.

This perhaps happens because of the teaching manner presented for them, where many times the concepts worked are far away from the practice. They present a little or no one relation to the facts of the quotidian. They don't use appropriate didactic resources that motivate and help the learning process.

According to Heineck [2], Physics classes with support of experimental, organized and adapted methods, provide the incentive, favor the learning, increase expectations that students develop during investigation techniques, stood out by Vygotsky as the zone of proximal development [3].

Even so, unhappily, most of schools do not have or can't acquire materials for Physics laboratories, because of their very high costs, or they do not offer physical space for their assembly and use.

Due to such difficulties, many teachers adopt traditional methodologies of simple repassing contents (with the use of resources as blackboard, chalk and didactic books) couldn't make it possible to use methodologies in which students can practice the knowledge they've got from theoretical contents.
3. EDUCATIONAL SOFTWARE WITH CONTENTS OF PHYSICS

The Passo Fundo University Department of Physics, during more than 20 years, elaborates tests and adapts equipment for laboratories of Physics from instructional materials. Those, for its time, have also been tested, appraised and approved by teachers from regional schools, in systematic meetings promoted by Physics area.

The software that was developed, in partnership between Physics and Computer science areas, is an educational multimedia software composed of Physics contents (based on the equipment and experiments produced in laboratory), organized in different modules. Each module has: specific conceptual explanations about the studied content, additional information related to the content, a video with explanations that reproduce the equipment and experiment done in laboratory, an interactive experiment based on the experimentation accomplished on the video and interpretation exercises and comprehension of the content.

This way, we searched through this educational software to supply schools with a didactic resource for their teaching learning of Physics contents with experimental methods.

4. METHODOLOGY OF THE RESEARCH

The concern of this research was not just in obtaining quantitative data, which become insufficient to achieve the essential, but as the teachers see their formation and how it interferes in their pedagogic practice. Therefore, the accomplishment of a study centered in the educational practice of a qualitative approach was proposed and that in agreement with Bardin "falls back upon indicators not frequencies susceptible of allowing inferences" [1].

Thus, the research activities accomplished at the target-school happened in the following way and under these conditions:

a) the research had as objective two groups from high school from the same grades and from the same teaching institution;

b) in group A, the teacher of Physics discipline worked the content on Newton's Laws just using the traditional methodology (Blackboard, chalk, bookish and theorization);

c) at the same period of time, the teacher of Physics discipline taught the same content using the educational software with his students from group B;

d) after the two groups have worked the same content with the same teacher, even so using different methodologies and didactic resources, we collected the data with the Physics teacher and students from both groups;

The instruments used to collect data were characterized for containing 10 driven questions, that they looked for to collect information on the use of the didactic resources adopted in classroom, the understanding of the worked content, the influence of the different methodologies adopted about the same theme for the same teacher and the relationships of Physics content with daily routines.

After finishing the collect of the data with the educator and students from the two groups of the school-target, the analysis of content of that information was accomplished.

5. SOME RESULTS AND CONCLUSIONS

Thus, among the main results and conclusions obtained with this research, we can mention:

1) students great majority, of both investigated groups, were unmotivated in concerning physics discipline, regarding the methodology and resources used in classroom;

2) the teacher drove the classes, in general, with many theoretical explanations and formulas, little practice and use of experiments, demonstrating a very strong dependence of an only didactic book;

3) even so, analyzing specifically group B, in which the students used the software for their teaching-learning of Newton's Laws content, we could notice that:
- there were more motivation and interest for all the students in learning this content;
- some students could to understand the content well and others presented learning difficulties, using the educational software as only resource in classroom;
- a considerable number of students pointed to the use of a hybrid approach (of methodologies and resources), springing here up indicatives for new subjects to be investigated;

Therefore, we can notice through these results and conclusions that many of our objectives were reached, as well as, spring up strong indicatives that new researches need to be accomplished as continuation of this work.

On the other hand, we hope that the software here proposed as well as the results to be obtained with this research can help in the reflection of the use of the new technologies at schools and to contribute, positively, to the teaching of Physics contents becomes more joyful and stimulant for the students.

6. REFERENCES