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LABINFORFÍSICA, WEB SYSTEM TO SUPPORT THE TEACHING- LEARNING PROCESS IN HIGH SCHOOL PHYSICS SUBJECT

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Abstract: Due to the difficulties found by the students in understanding the complex concepts of Physics using only books, it was verified the need to develop a web system with animations and laws about electricity, topic of the referred discipline. In this work, interviews were conducted with Physics professors to collect opinions regarding the use of technology in teaching the discipline. Soon after, a study was carried out on informatics in education, focused on the teaching of Physics and learning objects, with the purpose of adding knowledge about the use of technologies in education. An online system was developed with animations and interactive pages containing concepts and laws of Physics on the topic of electricity. Once the development stage was completed, an evaluation was carried out with a Physics teacher on the developed system.

Keywords: Teaching Methodology; support material, meaningful learning

INTRODUCTION

The discipline of Physics, according to Fiolhais and Trindade (2003), has a high level of failures, this occurs at various levels and in several countries. The same authors address the difficulties that many students encounter in learning physical phenomena, for them, one of the reasons for this problem is the teaching method used, emphasizing the absence of modern pedagogical resources.

Valente (1999) addresses that “The computer can be [...] used to enrich learning environments and help the learner in the process of building their knowledge.” (VALENTE, 1999, p. 11).

For Moran (2009), students appreciate technologies, which allow a high level of interaction. For Alves (2002) animation is: “[...] a powerful pedagogical tool, not available in textbooks and of great value in illustrating dynamic processes.” (ALVES, 2002, p. 202).

According to Silva, Germano and Mariano (2011), with the possibilities of computer use, the discipline of Physics can be one of the most benefited by the use of technologies.

METHODOLOGY

In this work it was proposed the creation of a Learning Object to be used by teachers and students through the world wide web. In view of this, the construction of an application for contents of the discipline of Physics was defined in view of the difficulty of understanding found by the students.

With the theme defined, a Physics teacher was contacted to gather opinions on how technology could help in the teaching and learning process of that discipline, after the meeting the following procedures were carried out:

- Exploratory research with seven Physics professors in order to obtain different opinions;
- Bibliographic survey on technologies in teaching, teaching of Physics, technologies in teaching Physics and Learning Objects.
- Meetings with the Physics professor at IFSULDEMINAS – Campus Machado for the development of animations;
- Development of a web system with main electricity concepts in the form of animations and self-explanatory calculations;

The exploratory research with Physics teachers aimed to understand if they used some form of technology in the classroom, in addition, if they considered the contributions of technology to the teaching of Physics to be important, what did they think of an online system? line that would help explain how electricity works.

Once the stage of interviews was concluded and the positive result was seen,

the bibliographical research in books and articles on technologies in education, teaching of Physics and Learning Objects began. The creation of animations and the web system that were guided by professors, one of Physics and the other of Computing, both from IFSULDEMINAS – Campus Machado.

The use of ASP.NET Web Forms technology in C# with MySQL database was defined for the creation of the system, the application was developed in Visual Studio 2012 software, the animations were built in Adobe Flash CS6 tool. UML – Language and unified modeling was used to model the system.

RESULTS

The system is available for internet access, and it is hosted on our institution's server. The system consists of nine pages, eight of which are accessed by students and one of the pages can only be accessed by teachers, the pages are: copper atom; Potential Difference, Electric Current; Resistance; Series connection; Parallel connection; Power Calculation; Ohm's Law; Quiz; Teacher Access Page.

When the student enters the system, he is directed to the quick access page, where he can access any of the pages of the application.

The first animation displays a copper atom, the animation can be seen in Figure 1A. The next page illustrates the formation of electric current in a conductor, the image of this animation can be seen in Figure 1B.

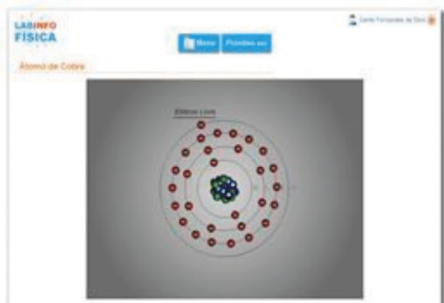


Figure 1A: Copper atom



Figure 1B: Potential difference

Source: Prepared by the Authors.

Figure 2A displays the image of the animation of the electric current, in which, through a voltmeter, the ddp is shown. Figure 2B represents the image of the animation that addresses electrical resistance.

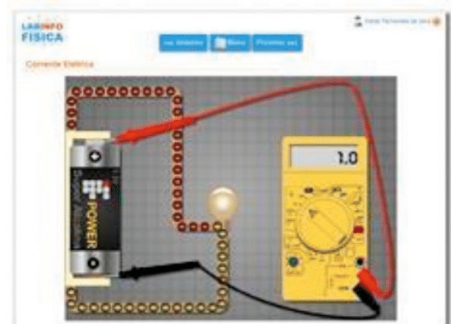


Figure 2A: Electric current



Figure 2B: Electrical

Source: Prepared by the Authors.

The Figure 3A shows an illustrative animation of a series connection. Figure 3B shows the animation that addresses a parallel connection.



Figure 3A: Series connection



Figure 3B: Parallel connection

Source: Prepared by the Authors.

Figure 4A represents the electrical power page. On the respective page there is a text with examples explaining what electrical power is and how to calculate the consumption of the device. Still on that page, there is another subheading “How much do you spend in stand-by mode?”, whose objective is to make students aware of electrical consumption. Figure 4B illustrates said page.



Figure 4A: Calculation of electrical



Figure 4B: How much you spend in standby mode

Source: Prepared by the Authors

Figure 5A demonstrates the Ohm's Law page. Figure 5B refers to the Quiz page that contains five questions with four alternatives each, only one being correct.



Figure 5A: Ohm's Law



Figure 5B: Quiz

Source: Prepared by the Authors

Figure 6A shows the page referring to the number of questions corrected by the student. Figure 6B illustrates the general result page of the Quiz, which is accessed only by the teacher.



Figure 6A: Quiz results



Figure 6B: Overall Quiz Results

Source: Prepared by the Authors

CONCLUSION

Considering the need to develop new methods to complement the teaching and learning process of Physics, this work presents a system that can be used by students, helping them in the process of building knowledge. The aforementioned system was evaluated and tested by a professor in the area who attested to its functioning. According to him, the system is an “Excellent application, intuitive, with excellent content, certainly, students will learn much more using it. It will facilitate the teacher’s work, as the teaching/ learning process will become simplified. Congratulations on the initiative, the work will certainly bear many fruits.”

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