Moodle and Physics learning: A good experience with High School students

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Abstract

The process of learning logical and mathematical concepts is largely rooted in the training of problem solving by the use of drill exercises. The new digital learning platforms like Moodle, present themselves as extremely useful tools in the process of fixing knowledge of disciplines such as Physics, Chemistry and Mathematics, through monitoring students through iterative activities in virtual environments on extra-class periods. This work presents the use of Moodle in Physics course for students at the first year of High School with an efficient mechanism in the memorization process and absorption of knowledge taught.

Keywords: Moodle, Physics Learning, Drill Exercises, Homework, Memorization.

Resumo

O processo de aprendizagem de conceitos lógicos e matemáticos é largamente enraizado na formação de resolução de problemas com o uso de exercícios de perfuração. As novas plataformas de aprendizagem digital, como Moodle, apresentam-se como ferramentas extremamente úteis no processo de fixação de conhecimento de disciplinas como física, química e matemática, através do acompanhamento de alunos através de atividades iterativas, em ambientes virtuais em períodos extra-classe. Este trabalho apresenta o uso do Moodle no curso de Física para os alunos no primeiro ano do Ensino Médio, com um mecanismo eficiente no processo de memorização e absorção do conhecimento ensinado.

Palavras-chave: Moodle, Aprendizagem de Física, Exercícios práticos, Trabalhos de casa, memorização.

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I. INTRODUCTION

One of the education paradigms is the process of memorization and retention of knowledge learned [1].

Usually, when students are exposed to a new content, this is a critical part of the learning process, especially in disciplines that use logical and mathematical concepts.

However, strategies such as tutoring, aiming to maximize the contact time of the students with the content taught in the classroom, are impractical for most schools due to lack of logistics. Often, this reality comes to extreme situations, as in most of the Brazilian public schools, where High School students have about two classes (50 minutes each) by week, in extremely important disciplines such as Physics and Chemistry.

Given the restriction of working hours in these subjects, teachers are compelled to teach the content without having enough time to drill together with students the object of study. Delegating to students the obligation and responsibility to train alone and face the problems contained in the textbooks, as part of the learning process.

The results obtained with this teaching method in most cases are catastrophic. Mathematical and logical areas of knowledge suffer chronically with this procedure because, coupled with this fact lies the sad reality that most of the world's population has serious difficulties in logical and mathematical reasoning Ginsburg (1997). Then, a big part of any group of students subject to this strategy will give up quickly learning Physics, Chemistry and Mathematics as soon the first failures in trying to solve the proposed problems occur.

The great error generated when applying this methodology is based on the learning process in students responsibility. At graduation courses, this procedure can be taken due to the students degree of maturity. However, for students of high school, theirs immaturity does not allow the same degree of commitment, as universal truth. Then, requiring the use of mechanism to ensure the continued learning process of students in extra-class periods.

An interesting practice that can help students keep up to date and consistently integrated into the learning process outside classroom, is the collection of lists of drill exercises

performed as tasks. However, when working with a heterogeneous group, where most students fail to comply with their duties, making them perform tasks outside class, even under the penalty score on the activity proposed, eventually becoming a challenge.

Another problem of structure of most schools is overcrowding of classrooms. In Brazilian public schools, this last problem coupled with the fact that many teachers teach in more than one group of students, makes the amount of evaluation activities to be corrected virtually nonviable.

It is in this context that, Moodle is noteworthy, not only in undergraduate courses but also in courses in high school.

For the set of teaching tools available (various formats of evaluation activities with self-correction modules, discussion forums, hyperlinks to video-classes or sites of scientific content, etc.), this virtual environment evaluation makes feasible the implementation of detailed tracking of the development, and a constant monitoring of the participation of each student.

This paper presents quickly and succinctly the technique used with high school students via Moodle platform, aimed at improving the storage capacity and retention of content by students. The results indicate an improvement of almost 200% measured by the performance evaluation tests.

II. METHODOLOGY

Moodle is an acronym for "Modular Object-Oriented Dynamic Learning Environment", a free software, learning support, running in a virtual environment [3, 4, 5] The program allows the creation of courses pages of disciplines, working groups and learning communities.

Moodle allows the construction of online courses, his evaluation activities are in formats as: survey, forums, and lessons, among others. Besides the possibility of posting teaching material for consultation as lecture notes, hypertext, video-classes, iterative software, etc.

The great advantage of this platform compared to others is the possibility of monitoring the full participation of members of each course. For example, it keeps track of each student access being made available information as: access time, IP of the machine used for access, access date, and what activities were visited. All this information permits you to make a timeline of the accesses of each individual on the platform.

Other advantage are easily displayed activities that can be taught, particularly call attention to the lesson format, which allows the making of evaluative activities in various forms, such as multiple choice questions or numerical questions. These activities in lesson format, are available mounted to the wording and proper response in the field reserved for them, enabling automatic correction by the platform of the questionnaire completed by the student.

The self-correcting activities solves the logistical problem of the number of evaluation activities, to be corrected by the teacher responsible for the course.

Another tool provided by the Moodle platform for activities in lesson format is the control of the run-time, available date for completion and number of attempts. For example, the teacher in charge, to set up the activity in lesson format; can choose a fixed period in which students must access the platform and perform the evaluation activity.

May also, limit the execution time of each set of lesson exercises and may also allow the student to repeat the same lesson several times during the period allowed, or restrict the number of trials for one, forcing the student to previous prepare then solve the activity.

The proposed work using Moodle attempt to make that high school students perform the extra-class activities, in order to settle with the learning of Physics content taught in two classes per week (50 minutes each). Thus, these students weekly could access the course page and solve a lesson, with multiple choice and numeric drill exercises, addressing the topics studied in class. Generally, inside this set of exercises there is a group of hyperlinks to sites with useful videos, applets and information.

This work was carried out for two months (in May 1st and June 30th), and was observed its performance of 120 students divided into three classes, with approximately 40 students. At the first month, the students were given lists of extra-class drill exercises without the use of Moodle. These exercises were taken from the textbook used by the teacher.

During the second month, the students, through the process described above, have to solve one set of exercises per week. To measure the student's development two exams were carried out, one at May 31 and other at June 30.

Students who participated in this study are part of high school course integrated into the technical education of the Instituto Federal de Ciência e Tecnologia do Espirito Santo, in Santa Teresa Campus.

II. RESULTS AND DISCUSSIONS

After running the first list, was found that more than 90% of the students had done only 10% of the activities proposed in the list of drill exercises. This led to bad performance of almost all classes, at the first exam. As can be seen in the graph of average performance in the exam applied on May 30 presented in Figure 1. It is interesting to note that in survey conducted with students, on average they had done five exercises throughout the entire month.

Given the monitoring capacity of Moodle, the four activities implemented after May 31, were divided into integral participation (resolution of all lists), partial participation (resolution of at least one list) and non-participation. As can be seen in Figure 2.

Already, after using the Moodle platform, group A had a massive participation in the activities posted, approximately 73% of the students took integral participation, and they achieved an improvement in the average performance of the class of almost 200%. In contrast, group B and C, which had only approximately 50% and 24% for integral participation had smaller performance increases.

Compared to the results of the first month, students with the integral participation have solved 44 drill exercises.

Other data available on the platform was the extra-class period that each student allocated to study during the 4 weeks that the platform were used. There were students who provided over 15 hours studying the content taught, which represents more than 4 hours per week besides the two meeting weekly.

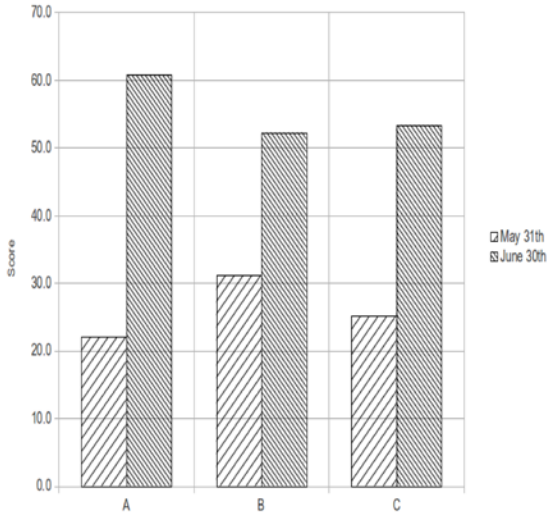

FIGURE 1. Percentage of participation for each group of students.

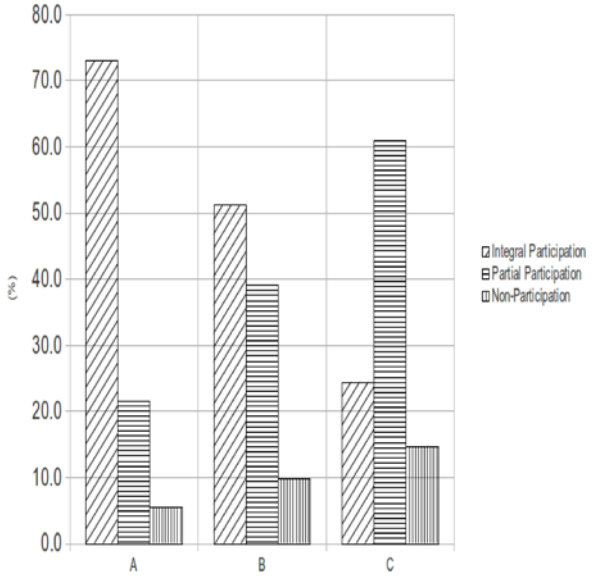

FIGURE 2. Average student performances over the two exams

The results could only be achieved, given the accessibility provided by the Moodle platform, beyond the management of multiple devices access and participation by the students.

Organization and commitment, these were the two main modification on students behavior, because the activities prescribed with dates to be performed made the teenagers adjust their hours of study, and monitoring the participation of the students introduced a greater degree of commitment to the activities.

III. CONCLUSIONS

As can be seen, the good results obtained by the proposed strategy through use of the platform Moodle, students were able to absorb and store the content taught in the classroom.

This digital resource is a powerful tool that can be used in the learning process of students, at high school. Giving teachers the ability to work efficiently with large groups of students, following the performance and participation of each individual student.

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