

PROSPECTION OF IMPLEMENTATION OF DISTANCE LEARNING AT IPEN – CNEN/SP FOR THE COURSE ON FUNDAMENTALS OF NUCLEAR PHYSICS USING INFRASTRUCTURE OF FREE SOFTWARE

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ABSTRACT

The main objective of the present work is to prospect the implementation of the methods and techniques of distance learning to the course of Fundamentals of Nuclear Physics, which is obligatory for all students of the graduate course of IPEN – CNEN/ SP (USP – Area of Nuclear Technology). It was chosen the free software MOODLE (Modular Object-Oriented Dynamic Learning Environment), created in 2001, which allows the collaborative educational work by means of internet navigation. The first part of the present work was to prepare a pilot project for the implantation of distance learning for the course on Fundamentals of Nuclear Physics at the graduate course of IPEN – CNEN/SP, by inserting in the platform all the lecture presentations prepared by the teacher responsible for the course, as well as papers related to the subject, videos, exercises and tests. A total of 118 students at MSc and PhD levels of IPEN participated of the research, as well as 16 professors responsible for several courses at IPEN. The data collection comprised the following phases: questionnaires about the profile of the students, utilization of the course inserted in the Moodle platform, opinion of the students about the use of the platform and opinion of the professors about distance learning.

1. INTRODUCTION

In modern societies, the use of computer technologies and of the internet are becoming increasingly important in educational activities, at all levels. One of the forms that is quickly developing worldwide is **distance learning**, or **distant education** [1], which presents the characteristics of being innovative and stimulating for students of all ages and mainly due to the possibility of opening the access of many different courses to a large number of students, including those residing in remote areas where the educational infrastructure is not adequate [2]. This is specially important in countries like Brazil, with a very large territory and with a population with urgent and not yet fulfilled educational needs. Distance learning focuses on technology and instructional systems that can provide education for students who are not physically in class [3,4].

In Brazil, in 1923 was founded the “Rádio Sociedade do Rio de Janeiro”, which started courses of Portuguese, French, Esperanto and others by radio transmission. In 1939 it was founded in São Paulo, the “Instituto Monitor” which started its activities mainly by mail correspondence and has nowadays thirty-two thousands students in the whole country. Today the “Instituto Monitor” has also e-learning courses. The “Instituto Universal Brasileiro”, started in 1941, is the best known course by correspondence in Brazil and today has more than one hundred and sixty thousand students. In later years, courses transmitted by television were created in the country, like the “Telecurso de Segundo Grau” of the Padre Anchieta and

Roberto Marinho Foundations.

In 1996, the legal basis was established in Brazil for distance learning, by the Ministry of Education and Culture, by means of the Law 9.394, of December 20, 1996. As to graduate courses, the regulation dates to 2001, by means of the decree 5622/05 of the CES of the National Council of Education. It is important to point out that the *strictu sensu* graduate courses, at Master of Sciences and PhD levels, according to this decree, can only be offered by institutions legally approved by the countries law.

The main objective of the present work is to prospect the implementation of the methods and techniques of distance learning to the course of Fundamentals of Nuclear Physics, which is obligatory for all students of the Post-Graduation of IPEN – CNEN/ SP (USP – Area of Nuclear Technology). It was chosen the free software MOODLE (Modular Object-Oriented Dynamic Learning Environment) [5], created in 2001, which allows the collaborative educational work by means of internet navigation. This platform, due to its interesting characteristics for application in educational activities is being used by several universities, in different countries, such as : University of São Paulo – USP, Pontifical Catholic University of São Paulo – PUC/SP, Pontifical Catholic University of Rio Grande do Sul – PUC/RS, Mackenzie University – all in Brazil, University of Lisbon – Portugal, University of California – United States, and others. In the University of Idaho – US [6], a study was made in order to compare the platforms for distance learning, free and non-free, and the Moodle platform was chosen as the best one, as regards cost/benefit.

The first part of the present work was to prepare a pilot project for the implantation of distance learning for the course on Fundamentals of Nuclear Physics at the post-graduation course of IPEN – CNEN/SP, by inserting in the platform all the lecture presentations prepared by the teacher responsible for the course, as well as papers related to the subject, videos, exercises and tests. A total of 118 students at MSc and PhD levels of IPEN participated of the research, as well as 16 professors responsible for several courses at IPEN. The data collection comprised the following phases: questionnaires about the profile of the students, utilization of the course inserted in the Moodle platform, opinion of the students about the use of the platform and opinion of the professors about distance learning.

2. IMPLANTATION OF THE PILOT PROJECT

In order that the Pilot Project would bring reliable results to the research, the material that was prepared by the Professor responsible for the course on Fundamentals of Nuclear Physics, Dr. João Alberto Osso Jr., was transferred very carefully, lecture by lecture, to the platform and consisted of: PowerPoint slides, papers and videos about the subject, exercises and tests to be responded by the students.

The student, to start the course, has to access the URL <http://tucano.ipen.br/moodle> and insert the user name and password, which were informed to them, allowing that only the participating students can have access to the course.

The Figures 1, 2 and 3 present some of the screens that were accessed by the students.



Figure 1- Initial page of the distance course on Fundamentals of Nuclear Physics



Figure 2 - First class of the distance course on Fundamentals of Nuclear Physics

In Figure 2, the first class of the distance course on Fundamentals of Nuclear Physics is presented.

In Figure 3, some lecture files are presented, as well as complimentary texts from the Department of Energy of the USA, a text prepared by the professor, a questionnaire and lesson.

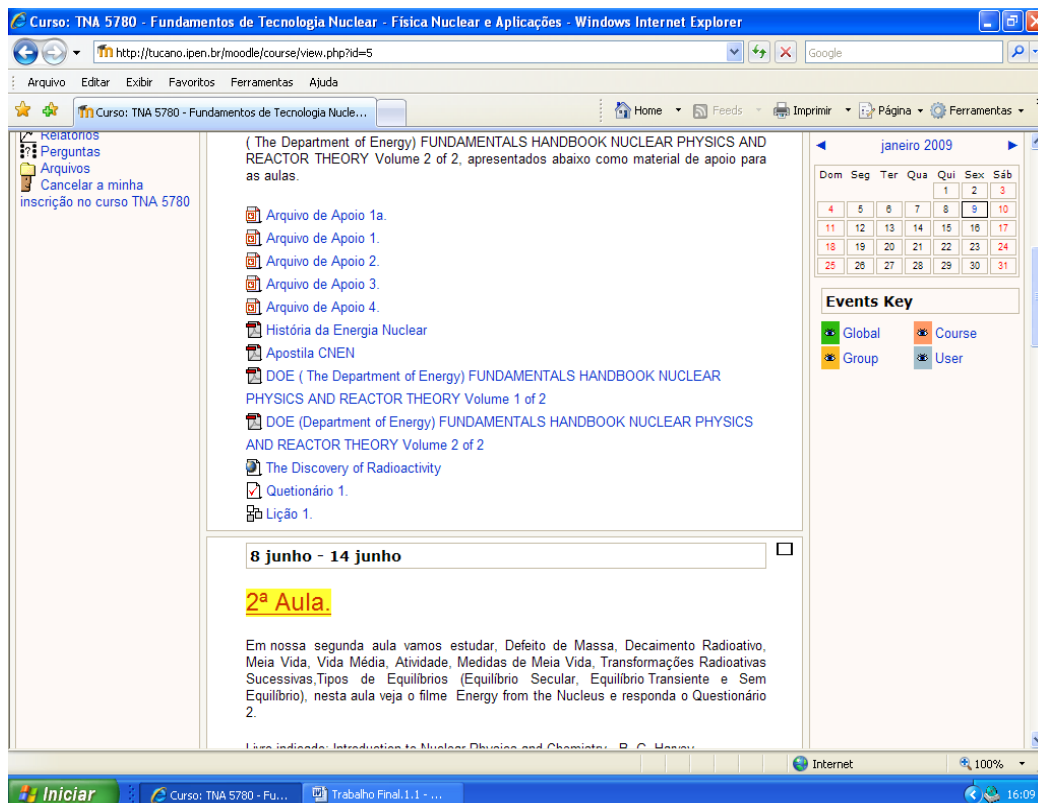


Figure 3- Screen showing files of the classes, texts, questionnaire and lesson presented to the students

Tests about knowledge acquired in the course were also developed and always at the beginning of each new class there is a demonstration about the new subjects that will be further presented to the students.

After the students were presented to the course in the Moodle platform, the next phase of the study was started .

3. RESEARCH ABOUT THE USE OF THE MOODLE PLATFORM AND ABOUT DISTANCE LEARNING

The data collection for the present study was divided in three phases: questionnaires about the profile of the students; utilization of the Pilot Project by the students, followed by questions about their opinion about it and, finally, questionnaire about the opinion of the professors of IPEN about the use of distance learning as a tool for their teaching activities.

From the students that were attending the course on Fundamentals of Nuclear Physics at IPEN, 118 participated of the research. Among the professors of several graduate courses at IPEN, 16 participated of the research. As instruments of the research, three different questionnaires were prepared.

According to the text on Estatística e Pesquisa (2007) [7], the types of questions utilized in the questionnaires were:

1. Open questions, which allow the respondents of the questionnaire to express their opinion freely.
2. Multiple choice questions, named also as closed questions, which limit the answers to the options presented. This type of question can be sub-divided in:
 - a) Questions that present several alternatives, giving several possible answers.
 - b) Estimative questions, which present scales or levels of intensity (increasing or decreasing), such as :
 - I disagree totally
 - I disagree partially
 - I have no opinion
 - I agree partially
 - I agree totally
 - c) Semi-open questions: these are intermediate between the open and closed questions. The respondents are presented to the questions of Type “a “, with several alternative answers, opening also the possibility of answering only the questionnaire or, in case that no alternative is considered as adequate, among the ones presented, an answer which is considered as more correct can be written down.

4. DISCUSSION

4.1 Results of the first questionnaire

In the first part of the research carried out by means of the questionnaires presented to the students before they had access to the course implanted in the Moodle Platform, the following conclusions could be drawn:

1. More than 98% of the graduate students of IPEN (77 % MSc students and 23 % PhD

students) have access to the internet and among these, more than 80 % access it daily, by means of broadband internet.

2. More than 58% of the students are totally dedicated to the graduate course and only a minority of about 39% exert a remunerated activity that does not allow total dedication to the course.
3. As to their time dedicated at home to the study, there was a great variability, ranging from 1 to 2 hours (9%) to more than 10 hours (23%), with peaks at 3 to 4 hours, 5 to 6 hours and 9 to 10 hours.
4. Another important point is related to the time that the students have to spend in their way to IPEN and the questionnaires demonstrated that most of them (47%) take from 1 to 2 hours to reach the Institute and a reasonable fraction (9%) takes from 3 to 4 hours, which represents a great waste of time and this is a point in favor of the implantation of distance learning at IPEN. Also it was verified that the majority of the students (58%) come to the Institute in the five days of the week.
5. When asked about the knowledge of virtual environments as tools for learning, such as the Moodle Platform, most of the students (73%) had not had any contact with this kind of learning resource. So, it was concluded that, in order to implant distance learning at IPEN, it would be necessary to provide training for the students.

4.2 Results of the second questionnaire

To start with the second part of the research, the students were invited to access the Moodle Platform for distance learning, applied to the course on Fundamentals of Nuclear Physics at IPEN, after which the second questionnaire was applied to them.

The main conclusions drawn, after analyzing the answers of the students, were:

1. More than 67% agreed totally and more than 25% agreed partially that the classes materials that were made available in the platform were beneficial for the study of the course.
2. More than 60% agreed totally and more than 33% agreed partially that the resources like computers, educational softwares, internet, etc, are efficient tools for teaching and learning.
3. As to the question stating that the combination of traditional classes with the availability of the class materials, together with videos, exercise, chats, etc improve the learning experience, more than 56% agreed totally and 27% agreed partially.
4. When asked if it would be possible to have the course on Fundamentals of Nuclear Physics totally as a distance course, using the internet resources, like class material,

tests, exercises, videos, chats with the professors, etc., there was a lesser agreement, with only about 8% of the students agreeing totally and more than 33% agreeing partially.

4.3 Results of the third questionnaire

The third questionnaire was sent to the professors of the graduate courses of IPEN and among them, there was a participation of 16 professors.

The analysis of the answers of the professors gave the following results:

1. More than 56% agreed totally and 37% agreed partially that the class material made available in the internet was beneficial for the study of the course.
2. About 44% agreed totally and 56% agreed partially that the electronic resources, like computers, educational softwares, internet, etc are valuable teaching tools.
3. About 37% agreed partially and 0% of the professors agreed totally that, if all the courses, besides being presential, were also totally available via internet (video files with the classes and teachers explanations, exercises, texts, chats, etc) the students would come less frequently to the classes, supposing that there was no need of control of their presence, with no decrease in the quality of the learning process.
4. About 19% agreed partially and 50% agreed totally that the combination of presential classes and distance learning, which includes several materials available in the internet, would enhance the students learning.
5. As to the question about the possibility of the course on Fundamentals of Nuclear Physics being totally a distance course, using all the resources available via internet, 25% of the professors agreed partially that it would be feasible and 0% agreed totally.

5. CONCLUSIONS

The research carried out with students and professors of the graduate course of IPEN-CNEN/SP, before and after the students had the opportunity of using the Moodle platform for distance learning, revealed that it would be interesting and important to implant distance learning at the graduate course of the Institute and the preference demonstrated was for a semi-presential course.

The implantation of this kind of course, even if not totally at distance, would imply in a considerably economy in transport and in time since many of the students spend several hours per week in their dislocation to the Institute.

Almost the totality of the students have access to broadband internet and are familiar with the use of internet resources, which are very important points for the success of a distance course.

On the other hand, they are not very familiar with distance learning platforms and this would imply in a necessity of training before the students can use all the resources of a platform such as the Moodle platform.

Although both the students and professors recognize that the technology resources via internet are valuable auxiliary techniques for learning, many of them still have a reluctance in accepting a course that is totally at distance, this being still a barrier to be dealt with in the future.

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