

THE MULTIMEDIA TECHNOLOGY IN THE PRODUCTION OF DIDACTIC MATERIAL FOR DISTANCE PHYSICS COURSES IN BRAZIL

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Abstract

This work aims to show the project developed at the learning environment of the Virtual Institute of the Federal University of Ceará (FUC), in Brazil, which currently is developing the Undergraduate Physics Course, besides many other distance courses. The project is developed by public Universities almost all over the country and we believe we are contributing to promote the access to the knowledge and learning for those Brazilian citizens who does not have the opportunity to attend an university presence course.

1. Introduction

All over the world, the online study has been an excellent way to bring the University to the student's home, allowing a high degree of flexibility in any academic program. There is no doubt that the multimedia technology is a powerful tool in the development of e-learning contents, which is inserting deep changes at higher education [BAGGALEY, Jon; KIRKUP, Gill]. The use of Distance Education (DE) mediated by the Information and Communication Technologies (ICTs) in the educational process, has favored the inclusion of a contingent of people in higher education, contributing to the increase places in higher education. This work aims to show the project developed at the learning environment of the Virtual Institute of the Federal University of Ceará (FUC), in Brazil, that currently is developing the Undergraduate Physics Course, besides many other distance learning courses. The development of teaching materials for the distance learning, plays a more significant relevance role than those ones we use for presence courses. This is because this is a process in which the steps of planning, construction, mediation and evaluation inherent to the traditional teaching, plus the endless possibilities of combining the diversity of information available and the benefits of interactivity, flexibility and dynamism favored by the ICTs require the implementation of this material in a more safely way. We can not forget that the students are not face to face with the teachers, so they need a material absolutely clear and easy of understanding. By developing the didactic material that is used at the distance courses, the didactic transition of the Virtual FUC, uses as a methodologic reference the socio-interactionism (FIORENTINI, L). In this context, the education becomes a dynamic task that allows to the students, themselves, the active construction of their knowledge, according to their experiences in different situations where they live. All the materials of the distance courses of the FUC, are available on line, different from some others courses in Brazil that use only written material. Though in our course, the student has also the option of printing, our structure is developed based on the idea of the use of on line material. The students are accompanied by a group of tutors, one for each city-polo. These tutors, all with minimal training in Specialization in Physics Teaching, accompany the students during the time that the subjects are applied.

2. The Virtual Learning Space: The SOLAR Environment

All courses at distance of Federal University of Ceará (FUC), are developed by the Virtual Institute of Federal University of Ceará (Virtual-FUC). Besides creating, implementing and maintaining the technological core, the Virtual FUC organizes the physical structure, logic and the educational progress of each course. The Institute Virtual-FUC created an environment of learning called SOLAR Environment (SOLAR), which is in charge of the developing of all distance courses sponsored by FUC. Using the multimedia technologies we are developing all didactic material for the Course of Physics, including all the pedagogical subjects necessary for the training of high school teachers in service, besides the contents of Physics for the Courses of Chemistry and Mathematics. The material is developed by a team composed by Professors, who are in charge of all the contents of Physics; Educators, experts at Pedagogy who are in charge of the Didactic Transition (DT) and technicians in ICT. This last team is composed by specialists in various areas of computing who use the multimedia technologies in order to transform the texts written by the

professors in e-materials. So, each class presents animations, retractable texts, vector animations, links to additional readings, chats, forums, in short, the classes are presented to the students in a very clear, simple and attractive way.

2.1 *The Professor's action*

The work begins with the preparation of the agenda of the subjects by the Professor author of the content. The agenda is the guiding document for all the work of the DT team. It acts as the axis on which the whole structure of the subjects rests. It is the tool of idealization of the classes. It shall contain essential information about the subjects as: menu, objectives, prerequisites (as needed), full details of the tutors, the number of classes and their respective topics and dates of start and end, a number of forums, portfolios, chats, conferencing, support material, bibliography and credit classes. After it is outlined the structure of the subjects, the Professor begins the work of preparation of the teaching materials, taking as parameters the pre-established agenda, without losing sight of your target audience. The Professor is in charge of the development of the contents of Physics. Almost all of them are professors of the University, with Doctoral in Physics, though there are some with Master course, only. The Professor is the part of the team who writes the contents of the various subjects. When he finishes the preparation of the classes, he sends the material to the production center of the Virtual FUC. The professor is in charge of the revision of all material and at the end, he authorizes the publication of the classes on line. Besides writing the themes, he is the responsible for coordinating the subjects. He monitors all the work of the tutors at distance, the online service and presence meetings. He is also in charge of the application and correction of assessments.

2.2 *The Production Center of the Virtual University Institute*

The Production Center (PC) of the Virtual-FUC is the Center of all operations for the Distance Education Courses. There are many teams in charge of each part of the work. This work can be understood as a flowchart of functions and actions such as the planning of classes, which includes methodological strategies and interactive tools. These tools are developed by teams composed by Educators and the constituents of the Center for Information Technology of the Virtual FUC Institute. The material sent by the Professor is analyzed by the educators, experts at pedagogy, who are in charge of the didactic transition (DT). The work of DT team is to promote the construction of a meaningful learning suggesting, where it is necessary, the use and the creation of tools that make the contents more accessible and easy to understand, in a format compatible with the methodology in question, without losing didactic proposal. Completing the work of TD, the lessons are sent, by email, to the Professor. After this initial contact, the material is sent to the Production Team (PT) who is in charge of formatting the material. This team of technicians is composed by specialists in various areas of computing who use the multimedia technologies in order to transform the texts written by the professors in e-materials. During the formatting is developed a technical procedure of implementing the proposal prepared for the WEB format. Are used specific languages and standardized documents that facilitate communication between the teacher and the teams of TD and production and development. The production team has a technical knowledge in graphic design and computer programming required to implement the proposal made by Professor and Team TD. The tools used for the interaction of the student with the new knowledge, are created by a team of graphic design of the Virtual FUC, along with the DT team, according the demand of the Professor. The use of these tools enables the integration of various resources in a single learning environment, and encourages the adoption and understanding of audiovisual language. In sequence we show some of one of these tools:

The Mouse Over: The Mouse Over is a feature that displays small text or image as an additional content. It can be used in any position of the sentence (beginning, middle or end).

The Floating Text: The Floating Text is suitable for present relevant information (short paragraphs or image) that help the understanding of the content presented. The key word that triggers this

feature can be positioned at the beginning, middle or end of sentence. The information generated by this tool allows highlighting the selected text.

The Retractable Text: This tool is used to both texts and images relevant and meaningful. These texts/images complement the content, but the Retractable Tool allows them to remain hidden so that the texts do not become too long and tiring. This tool aims to awake up the curiosity of students to get more information through its interaction with the tool in search of hidden contents.

Fixed Table With Brims: This tool is suitable to list, classify and enumerate small or medium texts with or without image, in order to organize and provide a better view of the issues addressed in the content.

Table Gradient Effect: This feature is available to assist, facilitate understanding and ease the reading of the items listed, where the colors change according to the positioning of the mouse and allowing highlighting the items when one the mouse passes over them.

Dynamic Capsule: This tool aims to promote student interaction and arousing their curiosity. It highlights the particular subject of the content through a closed capsule that opens when clicked. Suitable for quotes, definitions, descriptions and comments.

Parchment Effect: This tool displays the same characteristics of dynamic capsule however, it brings in its specific content for use in historical, literary or that portray the idea of the past.

Book Dynamic: Suitable tool to smooth the reading of content. Used for large texts and includes the use of images.

Dynamic Table: A tool developed to provide interaction with the themes. It includes medium or large texts, and allows the adition of pictures. Can be presented in various formats

Virtual Space Modeled: Action developed in order to facilitate understanding and comprehension of foreign languages. It makes possible the interaction with the magazines and objects of a virtual house. Each room is a screen. It is used mainly at the foreign language courses, English and Spanish.

At the end of the process of formatting, the material is sent for review to the DT team who analyzes if it is according to the initial proposal. After all, the material is published in test form, in WEB format, such as it will be delivered to students. Now the teacher analyzes again the material. With this final revision, he wants to make sure if everything is in line with its teaching proposal or if it is necessary some more adjustments. In the latter case, the teacher sends the material to the PT. By doing so, it returns to the stage of formatting. The entire process is reviewed once more by the teacher. If finally everything is correct, he gives his authorization for publication of the material in their final form. All process can be showed at the figure 1, that summarizes all the process of production of a class for the distance course.

3 Concluding Remarks

We are serving, about 400 students in the distance Physics Undergraduate Course (e-learning). Besides this, the project has been applied for 140 students of traditional courses (Undergraduate and post-graduate) and we are still applying until now. The delivery mechanism cost is very effective. All didactic material is on line with no cost for the students. All costs are supported by the Brazilian government. Nowadays the access to the material is exclusive for the studens, professors, tutors, and all people engaged with this project. The governement is intending to find a way to supply all the material of e-learning available to general people. Nowadays the main issue is the copyright.

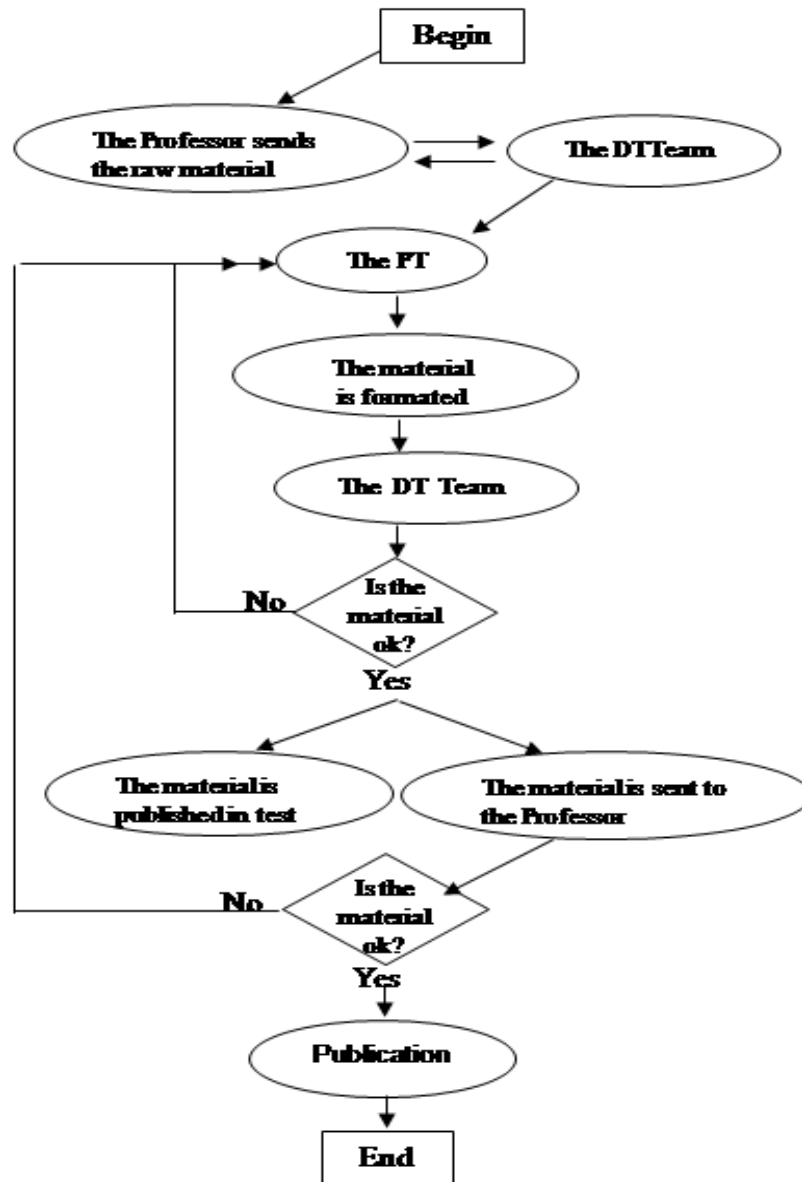


Figure 1: Schedule of preparation of a virtual class

We can observe a huge enhancement of the interest between the students, with significant results in their evaluations. As a result of the creation of Distance Undergraduate Physics Course, we hope contributing to overcome the huge gap in the teaching and learning of physics, for lack of teachers specializing in this area. The distance learning courses came not only to minimize the problem of teacher education in physics, but, mostly, to awake up young people's interest for this science through the use of new information technologies using the Internet, which attracts both the young people and persons of all ages. The interaction between the form and content, which are being brought by the new information technologies, is crucial in distance education but, nowadays, we can observe that even the Presence Course of Physics begin to incorporate these powerful tool in their teaching strategies.

References

- Baggaley, Jon; Hoon, M., Ng Lee (2005) Pandora's Box: Distance Learning Technologies in Asia, Learning, Media & Technology, v30, (1),
 Fiorentini, L. E Morais, R. (2000) Languages and interactivity in distance education, São Paulo, Brazil. P&D,
 Kirkup, Gill; Kirkwood, Adrian (2005) Information and communications technologies (ICT) in higher education teaching: a tale of gradualism rather than revolution. Learning, Media and Technology.