SCORM CONTENT: Technological and Educational Tool Mediator in the Teaching and Learning of Physics

Yucnary Daitiana Torres Torres, Universidad Pedagógica Nacional, Colombia
Hugo Daniel Marín Sanabria, Universidad ECCI, Colombia

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Abstract
This research shows the results of several experiences in the physics teaching-learning process, include teaching strategies intervene with the Information and communication Technologies (ICT) in Virtual Learning Environments (VLE), present many conceptions of the Learning Objects and make apparent that are mediator elements in teaching processes in the use of technological tools in the non-presently academic training (e-learning). In the research use the SCORM standard that get a contribution in the academic growth of the student. As fundamentally construct, the intention of the presentation of this integrator elements aren´t show in linear form, in order to preserve own dynamical processes of the implements of this educational tool.
In this case has an implementation in the Universidad ECCI – Colombia is in the Physics courses, using a material that refer to the Parabolic Movement, searching in the class the Knowledge Building. Parallel, in the same perspective, actually, the research group works in the constructions of SCORM content with the didactic sequences applied in the Universidad Pedagógica Nacional in physics courses for future teachers, in search of the basics as the movement of any particle. Pretend study the interaction of the senses in the phenomenological construction of the mechanical physics.

Keywords: Learning and teaching processes, Systematic processes, SCORM standard.

Problem

The academic activities that develop autonomously and outside classroom hours, constitute essential to the development of content of course and the own thematic elements of supporting the teaching-learning process, this strengthened dynamics of the work face-to-face in the classroom.

The execution of the decree 1295 of 20 April 2010 forced the Colombian universities to change their curriculum structure by academic credits. The intensity of face-to-face hours has been reduced and distributed in independent work, that should be used for the student requiring autonomy and discipline, the activities suggested by the teacher does not reflect guidelines or recommendations, the teacher considers what is the relevant or not for the personal development for the student, and evaluates the learning or not, these activities has been the subject of debate. As peculiar result, many of the students of Electronics degree of the Universidad Pedagógica Nacional - Colombia (UPN) and students of engineering programs in several areas of the Universidad ECCI - Colombia (UECCI), lacked of formality and study habits which leads to raise even more, the dropout rate programs, given the poor results they get from their academic work.

Therefore, it is important to re-determine the evaluative practice, particularly in academic spaces in which working the teaching of physics, the evaluation process may involve student experiences and contributes to the structuring and generation of self-knowledge. This paper shows the results of applying an alternate assessment designed to independent work hours, seeking to enhance the performance and teaching – learning, through b-learning strategy built in non-face-to-face and face-to-face activities in the course Physics I, whose central theme is the Newtonian mechanics.

Given the current technological tools for interaction with different themes, it is possible to select a strategy, it probably does not become relevant for the group of students that we work, to get a meaningful conceptualization compared to what has been reached in face-to-face activities, notoriously permeated by social, cultural and family context of each of the actors in the system, bearing in mind that is not necessarily accomplish with each educational context.

Thus is considered that in the interaction with the virtual environment a space "comfortable" and "intimate" for the student, where they can develop their ideas without inhibitions such as might occur in the classroom, to have few social skills or other situations which may intimidate, directing the student to a positive emotional state for learning, in this way the hours of individual and autonomous work are provided for the student to interact with the variables that will occur without fear of being judged by their colleagues, consequently an academic exploration as a mean truly free and independent, where the emergence of the dynamic in which is immersed generates a process of meaningful learning in the students and relationships arising from variables is encouraged and between variables that are recreated in the system, they generate a rewarding learning process, maybe it does not arise in the classroom environment and subsequently feedback with teamwork.

It is identified as a problematic the use of a virtual learning environment, compared with real classroom environments, we specify, that the virtual environment is not only a space to put up information, it is understood as an academic space with interactive processes, academic motivations that are related with the context, which should support the student´s interest in using their hours of independent work, focusing on complementary activities that succeed in implementing virtual environments.

Conceptual Aspects

Currently the dynamics of teaching at the school have been change from the different conceptions of it, in this regard is the need to involve relevant tools to strengthen these processes. For it should be focus on aspects such as the material used not only in classrooms, but instead also the students should use to perform their academic activities, giving importance to the many possibilities that now provide the society and media and communication.

Consequently, from autonomous activities can be identified basic elements among which are text, guide, and instructional booklet, orientation guide to learning, simulations, and technological elements. The intention of the developed work is focused on existing activities, improve and carry them to b- learning environments for enhancing cognitive, technological and learning issues.

The cognitive aspects belongs to attention, perception, memory, language and thoughts, considering that attention refers to the targeting mechanism, channeling and filter any of the cognitive processes; perception understood as the ability to interpret and understand the world individually from the stimuli received through the senses, which are affected by the emotional and symbolic interpretation that are handled within the same and different interactions with experience its context and in context; Memory is a process by which it is stored temporarily or permanently information, constructs knowledge and knowledge itself, which was acquired by sensory transducers so that it can be consulted before a need or a stimulus; language is an innate ability that they have to learn a language or a code that is used for individual to communicate, this depends on the perception, interpretation and reaction to the stimulus and finally engages thoughts, process that generates and modify ideas, by induction, deduction and abduction, Funmayor; Villasmil (2008).

From the technological view we must also take into account the different aspects that are addressed, primarily focus on the possible use of ICT mediated by a computer, using platforms that allow content LMS (Learning Management System). Bearing in mind that the interaction with these tools between student and teacher, also emerge various actors of the teaching - learning context that link the university and the student social context.

Thus the virtual education model, integrates tools of synchronous, asynchronous interaction and self-training, offering the possibility and the challenge to the teachers to incorporate them into their model of learning, the students take advantage, its own benefit and enhance their learning mechanisms.

Another purpose by using virtual tools is focused on benefit social learning and collaborative learning, through social software. The purpose of this model is to

contribute to the integral formation of individuals who may have an ethical behavior in virtual and real environments.

Now, considering that the hours of independent work, are a must in the curriculum of different programs covering the non-contact hours of classroom, and a proposal for education by encouraging learner autonomy to enhance cognitive thinking skills, which means, according to Aebli (1998) "learning to learn" and "learn to think" as intrapersonal skills that foster responsibility, commitment and organization of free time.

Pedagogical Requirements

The possibility of implementing this type of strategy overcomes the use of a Virtual Learning Environment, consisting pedagogically from each of the relevant aspects that gives us the pedagogical theory of constructivism as Carretero (1999), however, it must be remembered that in one way or another, when designing proposals that include instructional design, often fall on the theory of behaviorism.

From this point of view, the main idea in designing this Virtual Environment Learning (VEL) is that students perform a construction of their knowledge, not being a true copy of reality, but rather a construct used as a benchmark for the schemes they have built from their context, focusing on the appropriate of the operation of a device by the evident phenomenology functional models of Da-Vinci, Goldberg machines and experimentation in physics by using software.

Learning Strategies

It can be considered from three different points of view, which involve aspects to work on virtual learning environment, which will support the independent work of students.

Introductory and Testing Phase

- Recognition the importance and usefulness by the implementation of a virtual classroom
- Register on the platform
- Introductory Activity: three procedures are performed, one concerning at the participation in a test forum with a theme completely different of the thematic course, downloading a file from platform and uploading the Biography as a PDF file.

Proposal phase

Presentation of Syllabus schematically with proposals activities from each one of the themes, such as workshops, written, presentation of tests online, work with readings and make feedback process, always with the support of collaborative forums.

Interdisciplinary Phase

In this section. It is worked the interdisciplinary that allows physical with an educational proposal within the dynamics of the subject, which is the appropriation of concepts worked (e.g., vectors, kinematics, Newton's laws, and more…) in the course make a rigorous study of functional models of Da-Vinci, Goldberg machines and experimentation using software. Monitoring is performed by the intention to visualize the physical abstractions from the functions of each activity, bearing that the student makes a study of systems from different points of view.

Activities

The activities proposed in this Virtual Environment, are represented as follows,

Context Section

This section has a representative picture of some issues tackled in the course, they will show the objectives of the course, in this case is Physics 1, show to the students a generalized map of the course content and a manual for use and participation in collaborative forums. This section is expected that students will perform a reading of the basic concepts developed during the semester.

Platform Recognition Section

Many of the students have not had the chance to interact with virtual learning environments, of any kind, for this proposed three activities with the intention for recognize and explore the Moodle platform, the activities are downloading a file (Manual forums), participate in a forum of discussion about a topic unrelated to the course, e.g. the wonders of the world that each of the students want to visit and the final activity is to implement the upload of files using the virtual classroom in the exercise of creation of an autobiography. The objective of this section is to ensure that students have contact with the platform and with its future use.

Material Support Section

In this space provided to the students, the material that complements the learning process, e.g. some workshops on mathematics, such as first-order equations, systems of linear equations, reading analysis, among others.

Self-work and Collaborative Work Section

Proposed a forum for general discussion that support processes developed for the classroom work, the students discuss and comment on issues that are of general interest and this are not necessarily linked with the course. Consequently, proposed activities in the course, as materials, workshops and for the corresponding event reserved for each of them can make the final delivery of his work in each of the issues approached.

Cross Curricular Section

In this section the work that the student performs in his independent work hours (IWH), different from that reflected in the reinforcement activities, this is to generate study dynamics with a transversal activities involving relevant aspects worked in the course, using strategies such as "Física del Artefacto - The Physics of the Artifact", simulation of Goldberg machines using the software Algodoo, construction of functional models of Da-Vinci machines, attainment laboratory practices using the Tracker software.

Initially, The Physics of the Artifact is important for the students dedicate their independent work hours to research and go deeply in every involved concept on the artifacts of their everyday use and their operation from the physics perspective. Construction of working models of Da-Vinci machines, showing the evidence of Newton's laws in each situation, design and create Goldberg machines using the simulation software (Algodoo), the intention lies are the dynamics in numerous situations, for example, making changes in the friction between the materials, changing the lengths of displacement, emerging forces in the system and finally demonstrate the relationship between theory and practice by laboratory practices and analysis of the data acquired by processing the video of the phenomenon, using the Tracker software.

Experimental Activity Section

In this section collected the documents that prepared the students from different practices make in the laboratory.

Finally, is very important show that the employee of the ICT in the classroom is a learning tool, and if is approach for the teaching and the student, potentially the academic processes.

Results

Some aspects have reached, through the following results:

The chance of the interaction with the virtual environment, show another way doing activities using ICT, allowing to the students implement numerous strategies for communication and dissemination of problems related to the subjects of the course.

We find that for the first interactions with VEL by some students, do not have any motivation for using it, but with the use of these, they are claiming that the activities are developed through the virtual environment, because they find collaborative spaces where the asynchronous interaction with the other promotes a knowledge building.

From the possibility of using tools that support educational face-to-face processes, it has shown that the use of various multimedia materials captivates the student, as long as the support material is not an element that hinders the possibility of understanding of physics, that aren´t experienced in the theoretical work in the classroom dynamics.

In terms of teaching and learning physics begins an exercise in renunciation of the linear causality, the exercise of these activities emerging physics allows a new way to understand physics more contemporary and systemically, where the equations that are got could be understood as an approximation but not as a definitive law. Physics that is learnt and thought with the aim to be meaningful in life. Taking this into account is considered that physics is developed from the dynamical systems that respond to recent time and not to physics thought a century ago, that kind of physics that perhaps could be different if the minds who created it had had the access to the new tools that we have nowadays, surely the world that was built from physics a century ago. It would change radically dispossess from determinism that delimit the nature. e.g. Like the determinism that evidence lineal differential equations

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Contact email: yudatoto@gmail.com
Contact email:hmarins@ecci.edu.co