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## Modeling in E-learning System

Rogelio Ramos Carranza\*, Armando Aguilar Márquez, Frida M. León Rodríguez,  
Omar García León

*Universidad Nacional Autónoma de México, Cuautitlán Izcalli 54720, México*

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### Abstract

An old idea was to stage a school situation in university by the face to face system , a new idea is to stage as the school situation in college , but in an online system designed in terms of didactic engineering , to practices through numerical methods in MOODLE ( Module object- Oriented Dynamic Learning Environment) platform , the theoretical aspect that will support the mathematical object , are the basic ideas of the theory of e- learning [1] (from the English phrase we understand as learning).

The central proposal of this investigation is to highlight that in the teaching-learning process traditionally used in the in-person system ( face to face) , radically changed from the delivered content and necessary practice for learning a system online by MOODLE platform.

Then aims in this paper the design activities, according to the theory and practice of online learning and testing every one of the methods that make up a university course on Numerical Methods .

In particular consider the case of the gridding of a randomized data set; the mathematical object considered in this report will approach by the method of segmental cubic spline fit [2].

So we intend to prove that the staging of content and practices (activities) of numerical methods , appropriate to the learning styles proposed in the theory and practice of online learning [1 ], which can achieve significant learning.

The design strategy practices numerical modeling will support the concepts of the three (or four) basic schools of learning, ie, in the Behavioral Schools , Cognitivist , Constructivist and Humanist .

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\* Corresponding author. Tel.: +55-5518740522; fax: +55-56231886.

E-mail address: [egorre@gmail.com](mailto:egorre@gmail.com).

The content in conjunction with practices that correspond to numeric object considered in this work consist of a good description of the mathematical development of splines available in a document, other content element is a presentation where an example of the application of the method is used a case study, a third element is an interactive program that solves numerically, all integrated on the platform and practices are defined by the activities that are available on MOODLE , which may consist of questionnaires , crosswords, letters, memory games, problems involving a process, creating solutions for computer and other activities and resources.

The experiment was conducted with students from a public university in the state of Jalisco, Mexico. The test results of a functioning online material will be published in a later article to this ongoing investigation.

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## 1. Introduction

In this investigation is considered, for a good description, some of the aspects that make any scientific communication, so the body of this paper begins with the statement of the problem that we have considered, this approach is accompanied by the corresponding hypothesis. Below is a brief but clear enough description of the mathematical object hereof.

Having defined these two aspects, described in a particular way, but the most explicit possible theoretical aspects surrounding the investigation, beginning with a very brief description of the learning schools recognized by the international scientific community .

After discussing the fundamental components of effective online learning: preparation, activities, interaction and transfer student, likewise, the role of interaction in online learning is described .

Also considered theoretical aspects related to the attributes of learning, the role of interaction in online learning, a learning model on the Internet, and the section of the methodological framework concludes with a framework of how people learn the current possibilities of the web and the semantic web called [3].

At the end of this document briefly describes the experiment conducted with students from the University of Guadalajara, in the state of Jalisco, Mexico, which corresponds to a public, university other than the National Autonomous University of Mexico, in which the authors of this work teach mathematics.

## 2. Description of mathematical object

There is considerable variety of methods of numerical modelling of spline, which is considered here is the segmental cubic spline applied to a set of discrete data obtained from an experiment. The specific type of spline is called the natural spline. The mathematical model of the object is expressed by the equation:

$$y(x) = a_i(x-x_i)^3 + b_i(x-x_i)^2 + c_i(x-x_i) + d_i \text{ en } [x_i, x_{i+1}] \quad (1)$$

The model coefficients shown are determined using the equations shown below:

$$y_i = d_i \quad (2)$$

$$a_i = \frac{M_{i+1} - M_i}{6h_{i+1}} \quad (3)$$

$$b_i = \frac{M_i}{2} \quad (4)$$

$$c_i = \frac{y_{i+1} - y_i}{h_{i+1}} - \frac{2h_{i+1}M_i + h_{i+1}M_{i+1}}{6} \quad (5)$$

In the above equations, the values of the unknowns  $M$ , are calculated according to the expression:

$$6\left(\frac{y_{i+1} - y_i}{h_{i+1}} - \frac{y_i - y_{i-1}}{h_i}\right) = h_i M_{i-1} + 2(h_i + h_{i+1})M_i + h_{i+1}M_{i+1} \quad (6)$$

Using the above expression the values of  $M$  unknowns are determined, necessary for calculating the coefficients of the polynomial representing the mathematical model to the treated set of points.

### 3. Problem and hypothesis

The problem that arises here is that have not been adequately exploited the benefits of distance education, indeed, at the university where participants in this job, currently working, the support online or through the internet is not officially offers. As we intend to address the problem by providing resource options for learning numerical methods, particularly, this proposed topic, and using the Moodle platform.

It is hoped that through the proper use of computer support, available online through the Moodle platform, students succeed in better school performance

### 4. Methodological framework

#### 4.1. Learning schools

In general there are three or four schools of learning, in the design of educational material; these schools are: Behaviorism, Cognitivist, Socio-Constructivist and Humanist. Behaviorism strategies allow teach the facts and are used in the implementation of the course to show the formulations, algorithms or mathematical expressions of the method discussed, in this case the natural spline method. Cognitivist strategies will be used to teach the processes or procedures to be followed in the development and application of numerical method Included in this work. Constructivist strategies aim to develop a high level of thinking.

#### *4.2. Preparation, activities, interaction and student transfer*

A variety of pre-learning activities can be used to prepare the student for the lesson details, as well as to inform the student of the importance of taking their lessons online and show you how you can benefit from it. There is also a variety of learning activities that can be offered to the student to achieve the expected learning outcomes. Students need to interact with the interface to access the materials available online. The student interacts with the content to acquire the information needed to form the knowledge base. Students interact with each other and with the teacher. It should provide opportunities for students to transfer what they learn to real life applications.

#### *4.3. Learning attributes*

Online learning can be considered as a special case of general learning, online learning is so centered on the student as knowledge, assessment, and community.

##### *4.3.1. Online learning learner Centered*

The learning environment respects and adapts to the particular attributes of culture, especially the language and particular forms of expression that students use to interpret and construct knowledge. Learning activities focused on the student make extensive use of diagnostic tools and activities that cause the pre-existing cognitive structures are evident (or visible) to the teacher and the student.

##### *4.3.2. Online learning knowledge Centered*

Effective learning is therefore defined as limited by the epistemology, language and the context of the discipline of thought. Each discipline or field of study contains a view of the world that normally provides only ways to understand and talk about knowledge.

##### *Online learning assessment Centered*

The strategies are designed to provide formative assessment and summative evaluation with minimal direct impact on the workload of the teacher is urgently needed. There is a growing list of tools provided such assessments without increasing teacher participation.

##### *Online learning community Centered*

The participants in learning communities are defined as those who have shared sense of belonging, honesty, learning expectations, and commitment to participate and contribute to the community.

##### *4.3.3. A model of online learning*

An acceptable definition about the concept of interaction is understood as reciprocal events that require at least two objects and two actions and this happens when these objects and events are mutually influenced each other. Interaction serves as a wide variety of functions in the educational transaction. These functions allow control students, facilitating adaptation based on student input, allowing various forms of participation and communication and acting as a significant learning support program. Interaction is the component that defines the educational process and occurs when the student transforms the inert information passed from one student to another and builds on knowledge value and personal application [4]. Interactivity is a criterion for the selection of media for educational delivery. The interaction is fundamental to the creation of learning communities.

Interaction is a key component in constructivist learning theories [5] and induces the attention of students [6]. All forms of education are defined (including the supplied remote) as essentially interactions between content, Students and Teachers [7].

#### *4.4. theoretical framework of how the people learn, affordances of Web today and the semantic Web affordances experimentation*

It is possible to direct the potential of technologies to prepare the environment so that the most appropriate result for each of the ways in which people learn.

The current development of the Internet is entering an era in which the Web is changing from a medium of content delivery to one in which the content is provided with semantic meaning [3]. Semantic Web term is understood as the new ability to interpret the contents not only by humans but also by computers, because these files are written in formal languages (readable both by humans and computers), which enables the above are searched and updated by computer programs, commonly known as autonomous agents contained.

If reference to one of the ways of learning, learner-centered, the possibilities of the Web lies in the ability to support learning activities focused on community and individual. The possibilities of the Semantic Web for this form of learning are such that the content changes in response patterns of group and individual learning.

When the way of learning is focused on knowledge, the possibilities of the Web allow direct access to many libraries of content and learning activities organized from the perspective of a variety of disciplines. While the Semantic Web allows the use of agents for selection, customization, and reuse of content.

When the form of learning is focused on the community, the Web enables both synchronous and asynchronous interactions, collaborative and individual in various formats. In this form of learning, semantic Web makes possible the use of agents for the Interaction of translation, reformatting, change of time, monitoring, and common summarization.

In the case of learning focused on assessing the possibilities of the web are such that allow use of the time and place to change multiple options auto formative and summative evaluation of both peers and teachers. The possibilities of the Semantic Web for this case, allow the existence of agents for assessment, provision and review of "just in time feedback."

### **5. Experimentation**

The online material designed will be implemented, with students studying Multimedia Engineering, offered to students in the University Center of the Coast, located in the town of Puerto Vallarta, Jalisco, belonging to the University of Guadalajara.

We will use one of the most basic experiments designed, corresponding to the t - independent test of simple comparison, two groups, experimental and control, and performing two prior to the application of treatment and post-treatment tests received.

The control group will receive instruction in the traditional way, i.e., face to face and without the use of equipment designed for an online course. The experimental group will receive instruction completely online. Once applied the tests are evaluated and calculate means and variances for the data for each group are provided; which determines whether or not there are significant differences, in the mean or calculated averages.

This simple analysis will tell whether the course designed covers at least one of the objectives, which is to improve student achievement.

### **6. Expected results**

The challenge is to construct a learning environment that is simultaneously centered on learning, centered on content, community centered and centered or focused on the evaluation.

Most teachers have to learn to develop their own tools, so that they can meet the needs of students and the curriculum, developing a series of online learning activities that are adaptable to various needs of students.

We can expect of online learning, as all forms of quality learning will be Centered on Knowledge, Assessment, Student and Community.

The task of the designer and teacher of online courses is to select, adapt and improve (through reflection, feedback and evaluation) educational activities that maximize the potential of the Web. The creation of a model is usually the first step toward developing a theory. The model illustrates most of the key variables that interact to create contexts and educational experiences online.

The next step theorizes and takes measurements of the direction and magnitude of effect of each of the variables, resulting in important variables, including learning, cost, completion and satisfaction. The models presented in this document does not represent a theory of online learning , but they are expected to help deepen our understanding of this complex educational context and lead us to the hypothesis , predictions and major improvements in our practice .

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