

Análisis Comparativo de Metodologías Web para el Desarrollo de un Webquest En Entornos Virtuales de Aprendizaje

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Resumen. UNESCO 2008, in the Millennium Development Goals, aims to convince and pressure governments to increase investment in education and, above all, to support the globalization of information and communication technologies. Globalization seeks knowledge and use of The ICT. The objective of the present study was realized in a comparative analysis of methodologies for the development of Webquest in virtual learning environments. For the purposes of this research, a qualitative approach was adopted, the type of research was descriptive and the research design was field, in relation to the information collection techniques an interview was directed to virtual documents and documentary analysis of the Key documents related to the topic. As a result of the research process, a Webquest for virtual learning environments was built and a level of experts validated through a satisfaction survey to be applied in virtual learning environments. It was possible to build the Webquest using a UML methodology based on Web Engineering so that each teacher has adequate planning of their resources and activities and the student has a process guided with Information and Communication Technologies.

Palabras Clave: WebQuest, virtual education, UTN, Web Metodology

1 Introducción

The present research deals with the usefulness shown by the WebQuest as a didactic resource in Higher Education as a success case the Technical University of North, to verify if this tool is useful for teaching university teaching. In the same way we look for the evaluation of the teacher, as in the students to know their valuation in the work with this tool.

Starting from a theoretical foundation that supports this research, from the contextualization of the university in the project of Virtual Education, Web Engineering and Methodologies for Web development with emphasis to Webquest, the comparative

study of Web Methodologies for its application, the formation of Teacher for the curricular integration of the TIC and our main revision, the WebQuest as a didactic tool for the development of competences. The interest in doing this work is firstly to offer a study of the WebQuest, applied to the university, we can find numerous pages on the Internet and documents about experiences in the use of this tool in primary and secondary education in different disciplines. In the case of Higher Education, few studies on its application have been generated

The second concern to carry out this research is the implementation of this tool in teaching methodology, accompanied by technologies seeking to facilitate its management to teachers who do not have the technological skills, for this is intended with teachers to teach about the proper management Of the Internet and to update itself in contents that the Web offers for the subject and to identify those sources that are reliable, at the same time it allowed to put aside the resistance that some teachers presented and to verify that the Webquest is a resource that facilitates the teaching and promotes the Development of various competencies in the teacher and student.

2 INGENIERÍA WEB

With the emergence of web services, at the same time brought a serious problem to solve: interoperability. Although the exchange of data and processing was possible in homogeneous technological environments, it became complicated in heterogeneous contexts, being web services an obvious solution that emerged as a fundamental technological solution, key in this paradigm shift.

The combination of hypertext and multimedia, on the one hand, and the popularization of the Web, on the other, generated challenges that traditional methods were apparently unable to solve. Among them is the design and control of navigation through complex information spaces, which has led to hypermedia design methods and the so-called Web Engineering to present the navigational model as the big difference from traditional methods. [1]

Web Engineering (IWeb) applies "sound scientific, engineering and management principles, and disciplined and systematic approaches to the development, deployment, and successful maintenance of high-quality Web-based applications and systems." [2]

The birth of Web applications (WebApp) did not wait, those sites that were initially just information pages, were forced to provide visitors with some kind of service that combines flat pages with stored data. All this chaotic process led to the birth of unplanned sites in which an appropriate methodology was not used.

2.1 Web Metodology

Web application development encompasses non-trivial design and implementation decisions that inevitably influence the entire development process, affecting the division of tasks. Problems involved, such as domain model design, navigational modeling and user interface construction, have disjoint requirements that must be addressed separately.

Based on this separation of interests, the application development methodologies of Web applications arise that allow to specify the requirements attacking each of its most important aspects: the conceptual model, navigational and user interface. The conceptual model defines what will be the concepts / objects of the business that will be manipulated in the application.

The navigational model allows to describe what information will be presented usually grouped in a Node and how will be interacted with this information from the conceptual relations; A node, for example, indicates the criterion with which to display the business objects. Finally, the user interface model specifies how the information will be presented to the user and how the user perceives it in terms of visual elements. [3]

Mature web methodologies such as HDM, OOHDM, UWE, among others are examples of methodologies that facilitate the design of a Web application covering aspects (conceptual, navigational and user interface) separately. Next we will mention each one of them:

2.1.1. HDM Metodology

Hypertext Design Model (HDM) was developed in 1991 by Franca Garzotto, Paolo Paolini and Daniel Schwabe for the development of hypermedia applications. In this method two stages are characterized in the design of web applications: [4]

The design in the large, describes the general design and the structural aspects of the application, treats the (March, Tom, 2004) definition of the conceptual relations between the nodes of the application.

The design in small scale (design in the small), refers to the development of the content of hypermedia nodes, and is related to the implementation of these. It tries to solve problems like obtaining the information from a database, and with what development tools will be programmed. [1]

HDM focuses on large-scale design. The small-scale design is practically not addressed in the method and is limited to the assignment of content to the nodes. HDM proposed the access structures, which were then used by later methods.

2.1.2. OOHDM Metodology

OOHDM (Object Oriented Hypermedia Design Model) was created in 1996 by Daniel Schwabe (Pontifical Catholic University of Rio de Janeiro) and Gustavo Rossi (National University of La Plata). In OOHDM, navigation is modeled through the navigational class diagram and the context diagram [5].

The stages of Conceptual Design, Navigational Design, Interface Design and Implementation are developed in a process that combines an incremental, iterative and prototype-based design. The focus is on enriching the previous interaction.

It has separate activities that allow to obtain modular and reusable designs. You can also get a framework that contains specific designs that can be used in each of the stages. Developers will be able to generate their own library of resources that can be used in future developments, generating a common lexicon that improves communication within the team. Finally we look for schemas that allow mapping the design primitives (nodes, links, contexts) in deployment environments. In the case of implementation in non-object-oriented environments or languages, it is not direct, but since it is an object-oriented method, mapping with object-oriented technologies is facilitated.

OOHDM is a method for modeling large web applications, which can be used to model different types of navigable applications, websites, information systems, multimedia presentations.

2.1.3. UWE Metodology

UWE, developed by Nora Koch of the Institute of Informatics at the Manchen University of Germany, is a standard UML-based Web application development method [6].

In addition to the UML notation, they use the unified process of software development (Rational Unified Process or RUP) as a methodology for making hypermedia applications, so the process is iterative and incremental. The method is very similar to OOHDM, and the main difference lies in the notation.

The UWE design strategy is based on models that are constructed during the analysis phase, mainly the conceptual model and the process model. UWE introduces specific classes of processes as part of a separate model, which provides an interface to the navigation model.

2.1.4. UTN Virtual University Project

Distance education in Ecuador was born in 1976 with a single pioneer university and since then has served as an instrument of professionalism to thousands of Ecuadorians who without access to their usual populations have been able to access quality higher education. To date, 72% of Universities have some type of distance program, which shows the acceptance and demand that distance education has experienced [7].

Virtual education is a system of distance learning that is based on new communication and information technology (technologies, telecommunication networks, videoconferences, digital TV, multimedia materials), which combines different pedagogical elements in a device that contains: instances Face-to-face contacts, practices, synchronous real-time contacts (face-to-face, videoconferences or chats) and deferred or asynchronous contacts (tutors, discussion forums, e-mail. , As well as digital communication. It is from these resources that Virtual Education allows to configure different training scenarios that combined can provide a more meaningful learning.

In this sense, we consider that the Technical University of North, through its field of action, coverage, socioeconomic, geographic and cultural impact, has implemented a Virtual Educational Campus, strengthening the process of continuous training programs, within the framework of virtuality as methodology and Tool to develop education programs (courses, careers, leveling, among others) through innumerable ICT technological tools that allow to stimulate the learning, under the paradigm of constructivism where the student constructs his own knowledge of significant way inverting the process of the theory To practice, that is, to go from practice to theory, with changes in the traditional function facing the new challenges of virtuality.

The Technical University of the North (UTN), gains prestige by the virtual technological innovation, offering a new modality of formation, the same one that allows the permanent update of knowledge.

2.1.5. Webquest

"A Webquest is a research activity guided by Internet resources that takes into account the student's time. It is a cooperative work in which each person is responsible for one part. It forces the use of high level cognitive skills and prioritizes the transformation of information "[8].

According to Dodge Bernie [9] there are five basic points for building a good Webquest:

- ♣ Locating fabulous resources.
- ♣ Organize resources and students.
- ♣ Motivate the student.
- ♣ Use the medium
- ♣ Build a building to achieve high expectations.

"The main goal of Webquest is to make students use their time to obtain information, read, reflect and develop their own learning process and focus on the use of information rather than searching for it" 10]

With the objective outlined the Webquest proposes that the teacher implant their learning processes so that the student can improve their search for solutions to the problems raised in the areas of knowledge. In this sense Webquest reaches the student as an optimum material to reinforce their knowledge, because currently consulting on the Internet is a complex way to find real and reasoned information, since there is a lot of saturation of information that gives as a reflection confusion of the student.

In order for these objectives to be met, it is essential that the teacher provides the student with a motivating model with clear and well-defined guidelines for the process of exploring information.

The proposals of Dodge Bernie [9] and March Tom [11], mention that the essential components of a Webquest are: Introduction, Tasks, Processes, Resources, Evaluation and Conclusion [12].

Introducción

It provides the student with the basic information, guides him or her about what is expected and arouses his interest through a variety of resources. The goal of the introduction is to make the activity attractive and fun for students in such a way that interests them and maintains this interest throughout the activity. Projects should be told to students by making topics attractive, visually interesting, relevant to them because of their past experiences or future goals, important because of their global implications, urgent because they need a prompt solution or fun because they can play a Paper or something.

Tarea

In this section the student is provided with a formal description of something achievable and interesting that students should have carried out at the end of the Webquest. This could be a product such as a verbal exhibition, a videotape, build a web page, a presentation with PowerPoint, or perhaps a verbal presentation in which you may be able to explain a specific topic, a creative work, Or any other activity that requires the student to process and transform information that has been collected. A successful Webquest can be used several times, either in different classrooms or in different school years. Each time the activity can be modified or redefined and students can be challenged to propose something that goes further, in such a way, as to be deeper than the previous ones.

Proceso.

In this section we suggest the steps that the students must follow to complete the task, which may include strategies to divide the tasks into subtasks, description of the roles or perspectives that the students must adopt, ... the teacher can also add orientations On

learning, or on processes of group dynamics such as how to conduct a brainstorming session. The description of the process should be brief and clear.

Recursos.

They consist of a list of websites that the teacher has located to help the student complete the assignment. These are pre-selected so that the student can focus on the subject rather than drifting. Not necessarily all resources must be on the Internet and most of the newer Webquest include resources in the section corresponding to the process. It often makes sense to divide the list of resources so that some are scrutinized by the whole group, while others correspond to subgroups of students who will play a specific role or take a particular perspective.

Evaluación.

Evaluation is a new addition to a Webquest model. The standards must be fair, clear, consistent and specific to the set of Tasks. One way to evaluate students' work is through an evaluation template (Rubric in English).

2.2 COMPARATIVA, CONCLUSIÓN DE LA COMPARATIVA

Guidelines or parameters will be established to determine the best development platform of Webquest, to implement the Virtual Education project of the Universidad Técnica del Norte; It is planned to carry out a bibliographic study of the web methodologies, whose data will serve to identify which is the best option that suits the needs of the university and infrastructure that it possesses.

Once obtained the results of the comparison will proceed to indicate the proposal of implementation of the Webquest that will allow the development of the same, making the Virtual Education project a solid platform consolidated with a correct planning and development of courses to measure.

In the performance of the comparative analysis, it was decided to use the benchmarking technique of software engineering with an emphasis on web engineering, which is no more than a technique used to measure performance or compare methodologies with many approaches to be determined. Thus, companies and professional consultancies have determined phases to follow for the determination of products or services.

In this methodology methods or phases are presented to perform a good benchmarking process. We adapt to the characteristics offered by these methodologies without modifying the data that can be obtained. This process fulfills 3 fundamental phases of comparison which are:

- ♣ Planning
- ♣ Comparative Analysis
- ♣ Interpretation of results

2.2.1. Fase de Planeación

Esta es la primera fase fundamental ya que hace referencia a las razones por las cuales fueron escogidas las plataformas a comparar y cuáles son los fundamentos que van a ser comparados en las mismas, se presentaran las pruebas realizadas y se determinaran mediciones a los parámetros obtenidos de las plataformas MOOC.

2.2.2. Selección de las Metodologías

Para el análisis de las metodologías se ha determinado seleccionar 3 metodologías a ser comparadas, a continuación se presenta el listado de las mismas.

- **HDM:** Modelo de Diseño de Hipertexto Se decidió la selección de esta metodología web debido a la creación de aplicaciones hipermediales. En este método se distinguen el diseño a gran escala.
- **OOHDM:** La selección de esta plataforma se debe a que se modela la navegación a través del diagrama de clases navegacionales y del diagrama de contextos algunos componentes de la ingeniería del software.
- **UWE:** Esta metodología es elegida debido a que es un método de desarrollo de aplicaciones Web basado en UML estándar.

2.2.3. Técnica Utilizada para la Comparativa

Escala Likert: Al responder a una pregunta de un cuestionario elaborado con la técnica de Likert, se especifica el nivel de acuerdo o desacuerdo con una declaración (elemento, ítem o reactivo o pregunta) [13].

2.2.4. Comparativa de Modelos

Para la realización del análisis comparativo de las 3 metodologías las cuales se guiarán a las siguientes observaciones:

- **Oferta:**

Tabla1: determina el reconocimiento de la metodología o el apogeo que tiene a nivel internacional como también lo que cada una puede brindar a nivel educativo.

	Reconocimiento	Apogeo	Total
HDM	Buena	Normal	7
OOHDM	Buena	Normal	7
UWE	Muy Buena	Buena	9

- **Facilidad de Uso:**

Tabla2: establece la complejidad que presentan las metodologías ante otras, tanto en utilización, seguimiento, desarrollo e implementación.

	Utilización	Implementar	Total
HDM	Si	Si	2
OOHDM	Si	Si	2
UWE	Si	Si	2

- **Socios:**

Tabla3: En socios o integradores se encontrara las relaciones que tienen cada una de las metodologías y los tipos a los cuales representa sus asociaciones.

	Relaciones Educativas	Relaciones Empresariales	Total
HDM	Si	No	1
OOHDM	Si	Si	2
UWE	Si	Si	2

- **Distribución:**

Tabla4: Toma en cuenta las redes de comunicación y su mayor apogeo tanto por rama como por sitio, también el acceso público o privado que presentan estas plataformas tanto a su contenido, código, diseño y publicación.

	Red Mundial	Libertad	Total
HDM	Si	Si	2
OOHDM	Si	Si	2
UWE	Si	Si	2

- **Herramientas de Modelado:**

Tabla5: las herramientas de modelado están constituidas si una metodología web tiene algún instrumento de modelado de escritorio o web.

Metodologías	Herramienta Escritorio	Herramienta Online	Desc. Herramientas	Total
HDM	No	No	-	0
OOHDM	Si	Si	OOHDM-Web HyperSD	2
UWE	Si	Si	Argo-UWE	2

- **Notación**

Tabla6: Los componentes que poseen las metodologías para su correcta aplicación al proceso de desarrollo de aplicaciones Web [14].

Metodologías	Valoración	Notación	Total
HDM	Bueno	<ul style="list-style-type: none"> ▪ Nodos ▪ Enlaces ▪ Enlaces Navegacionales ▪ Elementos de Navegación 	4
OOHDM	Bueno	<ul style="list-style-type: none"> ▪ Diagrama de clases ▪ Diagrama de Contextos ▪ ADO ▪ ADV 	4
UWE	Muy Bueno	<ul style="list-style-type: none"> ▪ Casos de uso ▪ Diagrama de clases ▪ Diagrama de clases con estereotipos ▪ Clases de presentación (ADV) 	5

- **Costos:**

Tabla7: propone dichas observaciones con la métrica de costos de acuerdo a las metodologías seleccionadas [15].

Metodologías	Observación	Ponderación	Total
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HDM	Menor costo comparado con otras. Interfaz y navegación dependerá de los enlaces y comunicación de elementos.	Buena	4
OOHDM	Mediano costo comparado con otras. Reutilización de Objetos	Muy Buena	5
UWE	Relativamente alto al esfuerzo y tiempo ya que necesita crear muchos prototipos	Buena	4

- **Consolidación de Resultados**

Tabla7: Compendio de los estándares de evaluación de la metodologías Web

	Oferta	F.Usos	Socios	Distri b.	Modelado	Notación	Costos	Total
HDM	7	2	1	2	0	4	4	20
OOHDM	7	2	2	2	2	4	5	24
UWE	9	2	2	2	2	5	4	26

Conclusión de la Comparativa: Luego de realizar el Análisis Comparativo mediante métricas de evaluación se llega a determinar que la Metodología UWE se adapta para la construcción de un Webquest para un proceso unificado de desarrollo de software en el proyecto de Educación Virtual de la Universidad Técnica del Norte.

3 METODOLOGÍA:

3.1. Tipo de investigación

Para el desarrollo del presente trabajo se utilizó una investigación **cuantitativa**, con la que se va a lograr el criterio y análisis del investigador, lo que permitirá establecer características de gestión que requiere el usuario.

Se realizará una interpretación de datos **cuantitativos** que abordó la tabulación de un cuestionario estructurado a través de la estadística descriptiva.

3.2. Estrategias Técnicas

Se utilizó las siguientes técnicas:

- **Encuesta Docentes Virtuales:** Una técnica que se usará en la investigación para poder realizar sondeos y medición de opinión sobre el tema de entornos virtuales de aprendizaje y el uso de un Webquest.

3.3. Instrumentos

Los instrumentos que se empleó son:

- Para tener un procesamiento electrónico se utilizará Google Drive Forms
- Celular; como equipo de comunicación.
- Cámara fotográfica, que facilite recabar evidencia de la investigación

3.4. Tabulación Encuesta a Docentes Virtuales

- **Personal Involucrado**

Tabla8: Genero de los Docentes Virtuales que trabajan en el proyecto de Educación Virtual.

		Frecuencia	Porcentaje	Porcentaje válido	Porcentaje acumulado
Válidos	Masculino	18	64.3	64.3%	64.3
	Femenino	10	35.7	35.7%	100.0
	Total	28	100.0	100.0%	

Interpretación: Previa Entrevista a los docentes virtuales con un alto conocimiento en entornos virtuales de aprendizaje nos informa que el 62,29% pertenece al género masculino en tanto el 35,71% pertenece al género femenino.

- **Planificación (sílabo) para construir un curso en el Entorno Virtual de Aprendizaje.**

Tabla9: Docentes Virtuales que realizan la Planificación en los Entornos Virtuales

de Aprendizaje.

		Frecuencia	Porcentaje	Porcentaje válido	Porcentaje acumulado
Válidos	SI	10	35.7	35.7%	35.7
	NO	18	64.3	64.3%	100.0
	Total	28	100.0	100.0%	

4. RESULTADOS:

Estrategias Técnicas

Se utilizó la siguiente técnica:

- **Encuesta Docentes Virtuales:** Una técnica que se usará en la investigación para poder realizar sondeos y medición de opinión sobre el grado de aceptación del Webquest.
- **Grado de Aceptación del Webquest en los Entornos Virtuales de Aprendizaje.**

Tabla10: Grado de Aceptación de los Docentes Virtuales luego de haber utilizado el Webquest en los Entornos Virtuales de Aprendizaje.

		Frecuencia	Porcentaje	Porcentaje válido	Porcentaje acumulado
Válidos	SI	25	89.3	89.3%	89.3
	NO	3	10.7	10.7%	100.0
	Total	28	100.0	100.0%	

Interpretación: Luego del desarrollo del Webquest se aplicó una encuesta de aceptación en la cual nos muestra que el 89,3% de los Docentes Virtuales están

conformes con la utilización de la herramienta, el 10,7% afirma que necesita apoyo técnico para la construcción de los mismos.

4 Conclusiones:

“La educación es sin duda el más humano y humanizador de todos los empeños” [16]. Evidentemente en la educación recae el peso de una acción social que en muchos de los casos, no tiene las suficientes armas para desarrollar las habilidades necesarias y no se optimiza la utilización de las tecnologías, dificultándole al estudiante a enfrentarse a las numerosas demandas que se viven en la sociedad actual, inmersa en un proceso en el que la información es un recurso que es necesario aplicarlo a diversos contextos y generar conocimiento, el cual, se convierte en uno de los factores principales para el contexto socioeconómico.

En cuanto a la encuesta realizada al grupo de docentes luego de trabajar en sus Webquest, destacaremos algunos de los resultados obtenidos. En primer lugar que, aunque como era esperable, es posible constatar el aumento del uso de Webquest de las áreas en la docencia universitaria.

Al aplicar la metodología Webquest dentro de la estrategia de aprendizaje basado en el proyecto de educación virtual se han observado resultados favorables dentro del desempeño de los estudiantes, ya que guía las actividades que deben cumplir, construyen su propio conocimiento apoyándose unos a otros y siempre con la guía y supervisión efectiva del docente o facilitador.

La aplicación de esta metodología mejoró los estilos de aprendizaje de los estudiantes, trabajan de forma activa, dinámica, pero reflexionando sobre la mejor forma de resolver el problema, aprenden a aprender el uno del otro y también la forma de ayudar a que sus compañeros aprendan.

El haber aplicado el Webquest en el nivel de educación superior ha permitido desarrollar las habilidades, conocimiento y competencias que deben dominar para tener éxito en la vida personal como en el trabajo en el presente siglo.

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