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TOPIC:

Web application with 3D animations, using the DIUMPA methodology and free software tools.

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Web application with 3D animations, using the DIUMPA methodology and free software tools

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3D Animation, Diumpa Methodology, Web HTML5 application, Water

Summary. *The objective of this research focuses on creating a web application for the proper use of a nonrenewable resource like water with 3D¹ animations and the application of the DIUMPA², methodology in an project sponsored by EMAP-I company for schools located in Ibarra,*

The animations were created in Blender, a free software for this purpose. It also has other multimedia resources which intend to generate interest on students about social contents while improving the retention of information received by different channels. In creating the application, several free software tools were used.

Key Words

3D Animation, Diumpa Methodology, Web HTML5 application, Water

Abstract. *The objective of this research focuses on creating a web application for the proper use of a nonrenewable resource like water with 3D animations and the application of the DIUMPA methodology in an project sponsored by EMAPA-I³ company for schools located in Ibarra,*

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Keywords

1. Introduction

The development of the web technology in its continuous progress has defined new standards that open the doors for different design options, a better dynamic presentation and the retrieval of information helping students to achieve higher levels of retention about what they studied. (Morales González, 2009)

The use of multimedia in computer applications is indisputable. Nowadays it is an obligation to include it in all fields of study, especially, in education, which is regarded as a learning resource by allowing sending messages easily. This multimedia source, also, captures more attention and interest of students; so the market can offer a number of tools which applied properly allow to create educational solutions that improve learning processes and can be used inside and outside the classroom to reinforce the learning. (Guzmán, Pérez Alea, Carreira Quintela, & otros, 2010).

However, the fact that it is possible does not make it a reality. Although the technologies and tools are available, there are no applications that focus on specific topics, such as the one considered in this project. It means the proper use of water, not only education but social and topical issue. (Graf Rey, 2010).

The objective of this research is to implement a web application that could report and make aware the proper use of water in an open cross-platform tool. Blender allows modeling and creating graphics and 3D animations under the HTML5⁴ architecture (López, 2007) It also uses the rules of the DIUMPA methodology, which allows focus on the user interface, an aspect of great relevance in an educational application and even more when its main users are the students of the schools of Ibarra city. (Chiguano, 2012).

¹ **3D:** It means three dimensions.

² **DIUMPA:** Multimedia Interface design for the User Learning.

³ **EMAPA-I:** Municipal Public Company of potable water and sewerage, Ibarra.

⁴ **HTML 5:** HyperText Markup Language.

The application consists of 5 modules designed to introduce children data and information about water and the proper use to avoid waste.

2. Materials and Methods

2.1 Materials

For the project development a great variety of free software tools were that helped create each of the elements of the application, including the most important, Blender. It is an open source software dedicated to modeling animation and three-dimensional graphics both still images and high quality videos.



Figure 1. Blender Window.
Source: Blender Foundation.

Blender run into essential requirements for creating animations: capacity for modeling, animation, audio editing, integrated and fluid simulation video, which were used for creating characters and backgrounds of the scenes, with their textures, colors, and characteristics of each scene.

Another important element of the application is HTML5, fifth major revision of the core language of the World Wide Web, HTML. Architecture used to implement the web application. (Matthew, 2011).

In the project were used free tools like Audacity (Sound Editor), Gimp and Photophop (Image Editors) and Builder for creating assessment activities.

2.2 Methodology

For application development the study of DIUMPA methodology was performed, which focuses on the user interface with a specific sequence of steps that guide the creation of a multimedia project without generating excessive delays in the application implementation process.

This methodology helps create an adequate, functional, and aesthetic communication with the user providing an intuitive access guide that will keep the

attention and interest of the user, preventing the application quit unexpectedly. The methodology includes 4 phases:

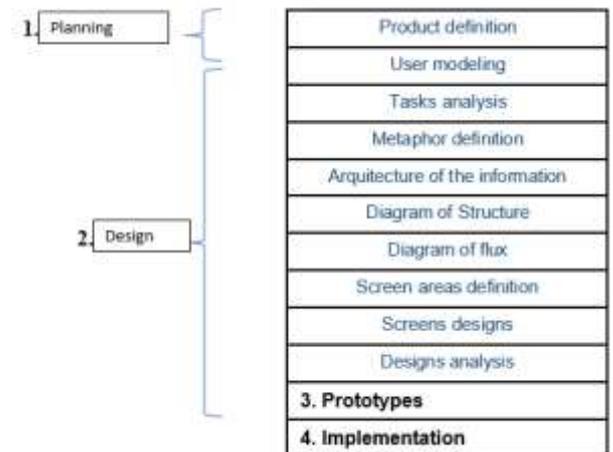


Figure 2. Steps - DIUMPA Methodology
Source: Own

In the planning phase was identified the specific parameters for application development.

Product Definition	
Overview	Transmitter: UTN Receiver: Children EB 4th year, Ibarra city (Sponsored by EMAP-I). Means: Web application Objective: Create a Web application that helps the process of learning of social issues such as water use.
Function	Training: It provides information and knowledge assessed through questions. Information: Contents that provide information about the topics.
Type of learning	Dewey: Development of research skills of school-based problem solving. Visual: Learning through graphical representation.

Chart 1. Product Definition
Source: Own

For the Designing phase, user modeling is performed during collecting the information about the characteristics of users or target audience.

User Modeling	
Profile	Gender: Male / Female Age: 8 years Country: Ecuador Region: Sierra

	Language: Spanish
Computer Experience	Medium and low
Need	Educate, inform, entertain
Common Characteristic	Primary children whose principal activity is the study and their main interest is the fun.
Access Condition	Screen, keyboard, mouse, audio.

Chart 2. User MOdeling.
Source: Own.

In the task analysis phase are specified the information that user will need and all tasks and actions to be performed from entering until you exit the application. Therefore, a script must be done for each animation and / or storyboard (animation outline) with objects and sounds.

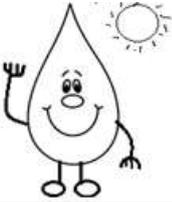

VIDEO: Sunny day and Paquito greets.
AUDIO: Background, Paquito voice greeting.

Chart 3. Storyboard
Source: Own

In defining metaphors are identified the objects and actions that will be used to relate the text with images of buttons and other elements of the application, as a visual metaphor, for example, next or previous button are identified.

In the architecture of the information the contents of the application modules and levels are structured. They will guide the diagrams navigation. It means, the sequence that the user follows within the application: display the menu, select 1 of the four options, and return will click back.

The next two steps includes defining screen areas, analyzing the GUI⁵, location of all elements and presentation of information with these established details the user interface based on color theory for the target group (children are designed) and interest of the application. Finally, at this stage the design analysis is done. It consists defining the element, function, and the way the object which is part of the application interface.

The third phase is the creation of prototypes, it means, a draft identified as low-fidelity prototype that allows visualizing what the outcome of the application. In this part, the final character Paquito was built, what he will say (audio), pictures background and the sequence in which they appear. Starting from this views, some modifications

and corrections are made according to the suggestions of a sample of users. It helps to finally reach the last stage called Implementation, where the high-fidelity prototype appears constituting the final product.

3. Results

Once the investigation is completed it is possible to obtain a product of high quality software, containing 5 modules with video formed from 3D images and presenting information on the proper use of water resources with an appropriate interface for children; however, it can be used by a diverse target audience.

The improved product quality is obtained by performing the rendering process, first by static images as video and then, with the consequent consumption of processing time, which is very high for an HD product.

It has also been observed that the application used by children from school has generated great interest in navigating through its many options, being very intuitive. The dialogue from Paquito, the main character of the application was entertaining them.

In the first instance, children retained information regarding the characteristics of water and its proper use. It could be checked with the execution of the test, as averaged 9/10, compared to the other group, which did not have access to the system, so the information were deliver in a verbal way exclusively. They reached an average of 6/10.

It was also found that although the DIUMPA methodology was created for a field study of Graphic Design. When applied to multimedia software, is required to increase a validation phase to identify not only the presentation of software but also its operation.

The modules created for the application are seen in the following chart:

Module	Initial Image of the Video
Water overview	

⁵ GUI: Graphical User Interface

Importance of water for living beings	
Do you know how water get home?	
Water usage	
Recommendations for a good use of water	

Chart 4. User Modeling.
Source: Own.

4. Conclusions

One of the biggest complications presented in the project is the rendering process, due to the large amount of resources required: processing, memory and this obviously affects the time variable. A convenient alternative that presents the DIUMPA methodology is prototyping low and high fidelity, which allows to present the product without excessive consumption of resources, leaving only high-definition rendering for the final product.

The question is then represented in defining the number of low-fidelity prototypes before generating the high ones, since they collect suggestions for improving the application and adjusted to the needs of final users. In the project it was decided to work with a low-fidelity prototype and it changes were made because this way helps optimize resources.

Another aspect to be established clearly is the navigational structure, which makes the system truly intuitive, and it also largely depends on the technological culture with final users and this will depend on your location. It means, whether it is a school with access to

technology or not, which could change the perceived behavior regarding the acceptance of the application.

What is completely clear is that students who receive information through different media, achieve better learning. It was tested by (Guzmán, Pérez Alea, Carreira Quintela, & otros, 2010) y (Morales González, 2009) cited in the introduction of this document.

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