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Master's Final Project



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Overview

The website I propose to develop will be a portal for the ‘Artificial Coral Reef Reproduction Project’ (ACRP) developed by a team of Marine Biologists and Educators from Universidad Nacional in Costa Rica.

The final product will be an educational website to help train and educate high school students from the Pacific Coast in Costa Rica to create and maintain artificial coral reefs near their communities. In this website the participating students can browse through six different lessons related to coral reefs followed by quizzes in which they can test their knowledge. These ‘**Lessons**’ include:

- What are coral reefs?
- Different types of Coral Reefs
- Taxonomy of the coral reef ecosystem
- Where do I find Coral Reefs in Costa Rica?
- Create an artificial coral at home
- How to create a Coral Reef with Reef Ball™

Other sections of the website include the ‘**About Us**’ page in which the visitor can find information about Universidad Nacional and the Team working on this project.

‘**Examine Costa Rica**’ will explain some facts about this country, its location, size, climates, regions and ecosystems. Another page will explain the ‘**Objectives**’ of this project, the goal of this website and what users can expect from it in terms of content, instruction and entertainment. Finally, the ‘**Quizzes**’ section will help students evaluate what they have learned so far and will point out some of the details they might be missing.

Background and Problem Statement

Coral reefs are in danger in many places around the world. Due to the proximity of human communities to coralline ecosystems, the human impact has been tremendous in these marine environments. Pollution, fishing, tourism and the global warming are the main threats to these marine ecosystems. In Costa Rica, the loss of the reefs represents a huge problem, not only because of the beautiful natural resources being lost, but also because these resources are key to the economy and subsistence of many coastal communities.

The School of Biology from Universidad Nacional in Costa Rica is developing a project not only to rescue endangered coral reefs off the coast of Costa Rica, but also to create new artificial environments to replace damaged areas.

The project consists in training and educating high school students from the Pacific coast area in Costa Rica to create and maintain artificial coral reefs near their communities.

To facilitate this process, I will create an educational website in which the participating students can browse through six different lessons related to coral reefs followed by quizzes in which they can test their knowledge.

Benefits of the ‘Artificial Coral Reef Reproduction Project’ to the community

- The scientists predict that this project will promote team work and a sense of commitment among the participants and will encourage the community to undertake similar projects in the future.
- The project as a whole will help clean the environment and keep it that way.
- More marine life is expected to come to the new reef.
- The new coral reef will encourage tourists to visit the area and stay longer.
- Businesses in this community will benefit from the tourists and new businesses might emerge as a result of the new attraction.

Benefits of the website to the ACRP project

- The website will provide all the information the students need to learn about coral reefs in an attractive and easy to read format.
- Most of the information about coral reefs on the web is in English. These lessons will be edited to be at the student’s knowledge level and in their language (Spanish).
- The lessons are interactive, motivating and self explanatory. There is no need for a teacher to follow the course.

- Being on a website, this information is available to anyone at anytime. Besides the people participating in the ACRP others who might be interested in coral reefs will be able to see it.
- The website will also help promote the Project outside Costa Rican borders. We hope the contents will be helpful to other interested audiences as well and that it will facilitate the communication with people working in similar tasks.

Area of interest

The ACRP will begin in the School of Paquera, a small town in the Puntarenas province. This school was chosen first, because of its strategic location, close to ‘Parque Marino del Pacifico; also because it is one of the poorest communities of Costa Rica and finally because a feasibility study showed that this area had all that was needed to grow an artificial coral reef.



The scientists hope that this community that is strongly dependent on the marine resources will beneficiate greatly from this project and that the new generations will get a better understanding of their surrounding environment and the benefits of sustainable development.

Target Audience

The intended audience for this website is the group of high school students from Costa Rica who live on the Pacific coast, and are participating in the 'Reef Rescue' project from Universidad Nacional. These students' ages range between 15 and 17 years old, are male or female and Spanish is their native language. They typically belong to low income families and have lived near the sea all or most of their lives.

Other audience that we could call 'secondary' is formed by the people who might be interested in learning about coral reefs in Costa Rica. This would be Spanish speaking people¹, from anywhere around the world. They would just need a computer connected to the Internet and the motivation to learn about coral reefs from Costa Rica.

The third possible audience includes people working in partner projects around the world that might want to cooperate in this project, learn from it, or share information with the researchers from Universidad Nacional.

¹ The website will be in Spanish.

Genre

This will be an educational website that will use the Constructivist model of education.

The constructivist model states that a student will learn at his/her own pace and that this student will 'create' or 'acquire' new knowledge based in what the instructor presents to them (Newby, Stepich, Lehman, Russell, 2000). This is a more dynamic view of the educational process. The learner is not just a passive receiver of information. The learner judges, classifies, discards or accepts what is presented to him/her and compares it to what he/she already knows.

The Constructivist model of education is interactive, and this is what we want to stress in this website. The user should be able to browse those pieces of information he/she cares about and use them to learn at his/her own rhythm. There is no pre-set order in which the user should study the lessons because they are self contained units. However, the lessons will be organized in ascending order from easier to harder or from more general to more specific.

The use of multimedia will enhance the learner's experience by providing him or her with various complementary stimuli (verbal, images, animation, sound and interaction). The combination of different media has proven to reduce the time necessary for the user to understand the concepts and at the same time it increases the ability of the user to connect those new concepts with prior knowledge (Schmeeckle, 2003)

Technology Assessment

The project will consist of a website instead of a CD ROM for the following reasons:

- **The Website can be used at anytime by anyone.** The website will always be there, the user will only need a computer attached to the Internet and he or she will be able to browse the website. Not only the people participating in the project will use it. If anyone wants to learn about the Costa Rican reefs they would be able to find this website on the Internet and use it for free.
- **This is a non-profit project.** Having to burn all those CDs and then figuring out a way to distribute them would only increase the expenses of the project. A website is cheaper to produce.
- **A website is easier to distribute.** We cannot ask the participants to come to a certain point and pick it up. Sending it by mail is not an option because the service is slow and corrupted. The website will always be there, you do not need to own it, carry it with you or install it every time you want to use it.
- **It is easier to update a Website.** This subject matter is very stable, but the exercises and quizzes the experts want to include in the website will or can change. The website gives us the option to upload new quizzes, add new content, change the pictures and include fresh information. The CD ROM is always the same, from the day you buy it to the day you buy the new version.

- **The space on the Internet is unlimited.** Even though this website will be limited to six lessons and a few more sections it will grow in the future. We want to be able to add as many lessons as necessary and perhaps other features like videos and a database archive.
- **With a website there is always chance to improve.** If we suspect students are not responding the way we were expecting, we can always change the strategy and include new technologies to help us out.

User Requirements

The users of this website should be familiar with computers, should know how to navigate on the Internet, be familiar with the mouse and keyboard input devices and should now how to browse a website to find information.

They also need to be familiar with technologies such as HTML forms, drop down menus and Flash applications.

System Requirements

To view this website, the user is required to have:

1. A computer running Win 95 or above or Mac OS
2. Processor (1GHz or faster)
3. Multimedia PC
4. Monitor (800x600 resolution preferable)
5. Input peripherals (mouse and keyboard)

6. Internet connection (56Kbs or faster)
7. According to the browser chart from *webmonkey.com* the website can be viewed with any of the following browser configurations:
 - Internet Explorer 4.0 or above,
 - Netscape Navigator 4.5 or above,
 - Mozilla (any version)
 - Firebird (any version)
 - Opera 5.11 or above
8. The user also needs the Flash player plug-in version 5 or above.
9. JavaScript enabled in the browser.
10. Flash Plug-in (player) 5x or higher

Current Situation

Public High Schools in Costa Rica normally have very old and slow computers and not all of them have Internet access. Even when they do have Internet access, the connection speed tends to be slow (44 Kb/s) and the computers are not always available to students.

For this project, however the project provides new computers to the High Schools that participate in this project. These systems have the following minimum configuration:

- 15” monitor SuperVGA
- Intel Celeron 2.2 GHz Processor
- Speakers
- Intel Extreme Graphics 3D

- 128KB L2 Cache
- 400 MHz Front Side Bus
- 48X CD-ROM Drive
- 3.5", 1.44MB Floppy Disk Drive
- Sound Card
- Standard keyboard
- 2-Button Wheel Mouse
- Windows XP Home Edition
- 56K ITU v.92 ready Fax/Modem

This configuration exceeds the requirements to use the website and once requested to the administrators, all the plug-ins and configurations necessary to run the website will be installed in these systems.

In the participating schools the students have limited access to the computer lab. Some times the lab is open for computer classes and some other times the computers are available for students to browse the internet or to use the programs under the supervision of a teacher. Because students have limited time to use the computers on their own, we need to make sure the website is exciting and motivating enough so that they use it in the limited time they have.

These students are already used to working with computers. They have used the Internet before and they know how to navigate through a website to find the information they are looking for. However, they might not be too familiar with Flash applications and HTML forms.

Since this product will be used to support the learning experience and not to replace it, the instructor will facilitate the process of understanding the different technologies employed in the website.

Formal Statement of Objectives

Goal

The main objective of this website will be to teach high school students from Costa Rica how to create artificial coral reefs with the reef ball and some basic knowledge about coral reefs' taxonomy and ecology.

Objectives

1. The student will be able to explain the basic facts about coral reefs, their constitution, location, taxonomy and ecology.
2. After analyzing the causes and consequences of coral destruction, the student will gain a better understanding of the importance of coral reefs, their threats and the strategies to preserve them.
3. By using maps to illustrate the places where coral reefs are located in Costa Rica, and showing taxonomy guides and pictures of the reef's biodiversity, the website will motivate students and other amateur divers to explore the coral environments from Costa Rica and overseas.
4. By using the computer as one of the main instructional tools, the website will stimulate users to perceive computers in general –and the internet in particular- as an important educational tool.
5. The users will be able to tell who is responsible for this project, what the goal of the project is, and he/she will be able to contact the coordinators.

Functional Specification

Title summary

‘Mundo de Coral’ is a portal to the ACRP project and to information about coral reefs in general.

In this website users will find general information about the people behind the ACRP and about Costa Rica. They will also learn the basics about coral reefs (morphology, taxonomy and ecology), where to find coral reefs in Costa Rica and the basics about creating an artificial coral reef using Reef Ball.

Besides the text information, the user will be presented with graphics and animations to help clarify some concepts in the six lesson sections. At the end of each section there will be html quizzes, flash activities, reflection questions or a mix of the three of these evaluation strategies.

Structure

About Costa Rica: Will present a broad background about Costa Rica like area in square kilometers, climate, different types of ecosystems, location, etcetera.

About UNA: This section will explain where and what is Universidad Nacional and who is behind the ACRP. Here we will provide links to Universidad Nacional main website, School of Biology and Parque Marino (Marine Park) because these are the main entities involved in this project.

Objectives: We want students and visitors in general to know the objectives of this website. After stating the main objective as a mission statement, we will list the other objectives and provide a link to a lesson that fulfils that objective.

Lessons: Each lesson will have the objective for that lesson at the beginning of the page, right after the name of the lesson. It will present content related to that particular subject and questions to meditate, discuss or auto evaluate. Lessons will be written in a casual tone to make it more appealing to our main audience.

Quizzes: The quizzes are fun and dynamic; they can involve a trivia or other type of game. Although the user needs to know some specific information about coral reefs to play the games (each one is related to one particular subject) the user can still play it without going over the lessons just to test how much he/she already knows. There will be a link from each game to the lessons that are being evaluated in that particular game.

Contact Us: This page will provide the email addresses and in some times office phone numbers and mailing addresses of the people involved in this project.

The main component of this website will be the lessons and quizzes. We plan to include 6 lessons explaining: what are coral reefs, the different types of reefs there are, taxonomy of the coral reef ecosystem, where to find coral reefs in Costa Rica, ecology of the coral reef ecosystem, and how to create an artificial coral reef with Reef Ball™.

The navigation will be non-linear. Once the user gets to the home page he/she can go to any section of the website. And from every lesson or quiz, or learning unit they can jump to any other section or the main page.

Metaphor

The website will use different tones of blue to simulate an underwater environment.

For the ‘Taxonomy Lesson’ I will use the dictionary metaphor. The picture of each species will be accompanied by a short description that will be formatted as a dictionary paragraph.

In the ‘Taxonomy Test’ I will use a landscape metaphor. A marine landscape will be presented showing different species from plants and animals. Below, the student will be shown a description of an organism or one of its functions. The student then needs to identify the organism by clicking the corresponding graphic in the movie. If wrong, the user will receive text feedback and if right, the movie will advance to the next question.

Title features

Data Base search

Lesson three includes a database search about species that could be found in the Costa Rican reefs. The database has a single table containing the scientific name, the common name, a description of the species, the url of the image and thumbnail image of that species and two more fields that I will use in the future: kingdom and location.

Field Name	Data Type	Description
Numero	AutoNumber	
NombreCientifico	Text	
NombreVulgar	Text	
Descripcion	Memo	
Imagen	Text	las imagenes se encuentran dentro d
Thumbnail	Text	
Reino	Number	1=animal / 2=vegetal / 3=fungi
Localizacion	Number	1= caribe / 2=pacifico

To browse the database the user types one or more words on an input box and the search engine will look for the occurrence of those words on the *CommonName*, *ScientificName* and *Description* fields on the *Species* table.

The results for that search will come up on a table containing a thumbnail of the picture of that species, the scientific name in italics and the common name. The common name will be a link to a 'details' page that will show a larger image of the species and the description along with the common and scientific names. This page will open in a new window.

Fun activities

Memo the Clown Fish Flash Game: By making fun of the way Costa Ricans adapt foreign culture to our context, this game will have a clown fish called 'Memo' (a common nick name in Costa Rica) that sounds almost exactly like Nemo (from the Pixar movie).

The screen of the game is divided in three vertical areas. To the left and right there are coral reefs through which the fish cannot swim. In the center of the stage, there is a coral reef corridor through which Memo swims forward (towards the user). But there are piranhas and rocs on the way, so the user should use the keyboard arrow keys to move the fish to the left or right and avoid collision. After the fish 'dies' 3 times the games is over. The user then has the option of restarting the game.

Edible corals / Fish tank corals: These activities are neither quizzes nor learning activities. These are just refreshing activities that the user can engage in to have fun alone

or with friends and family. They consist of recipes, the first one, will teach the user how to replicate coral polyps with marshmallows and candies and the second one will instruct the user how to create an artificial coral structure in a fish tank using ingredients that can be found at home or at the supermarket.

Learning activities

Coral Threats Flash Quiz: This quiz is a trivia game that dynamically loads ten questions from a text file. The best thing about this is that the questions and answers can be modified in the text file without affecting the flash movie and the new questions will load in the trivia automatically.

In this game, one question is presented at the time and a sound gives the user feedback about his/her performance. At the end of the test the user can see the score and can choose to play take the test again.

The Taxonomy Test Flash Game: The user will be presented with a coral reef scenario with different species of corals, algae, and animals. At the bottom of the image, there will be an explanation of the activity, like “Click on the animal who serves as a shelter for clown fishes.” If the user clicks the wrong organism he/she will receive some feedback explaining the real function of this species. When the user clicks the correct species he/she will receive a ‘correct’ message and the game will jump to another similar screen where the user will have to either click an organism or drag the item to the correct spot. An example would be an exercise like “Find the best shelter for the clown fish” where the options might be an anemone, a cave, a group of algae or a school of jelly fish.

HTML quizzes and activities

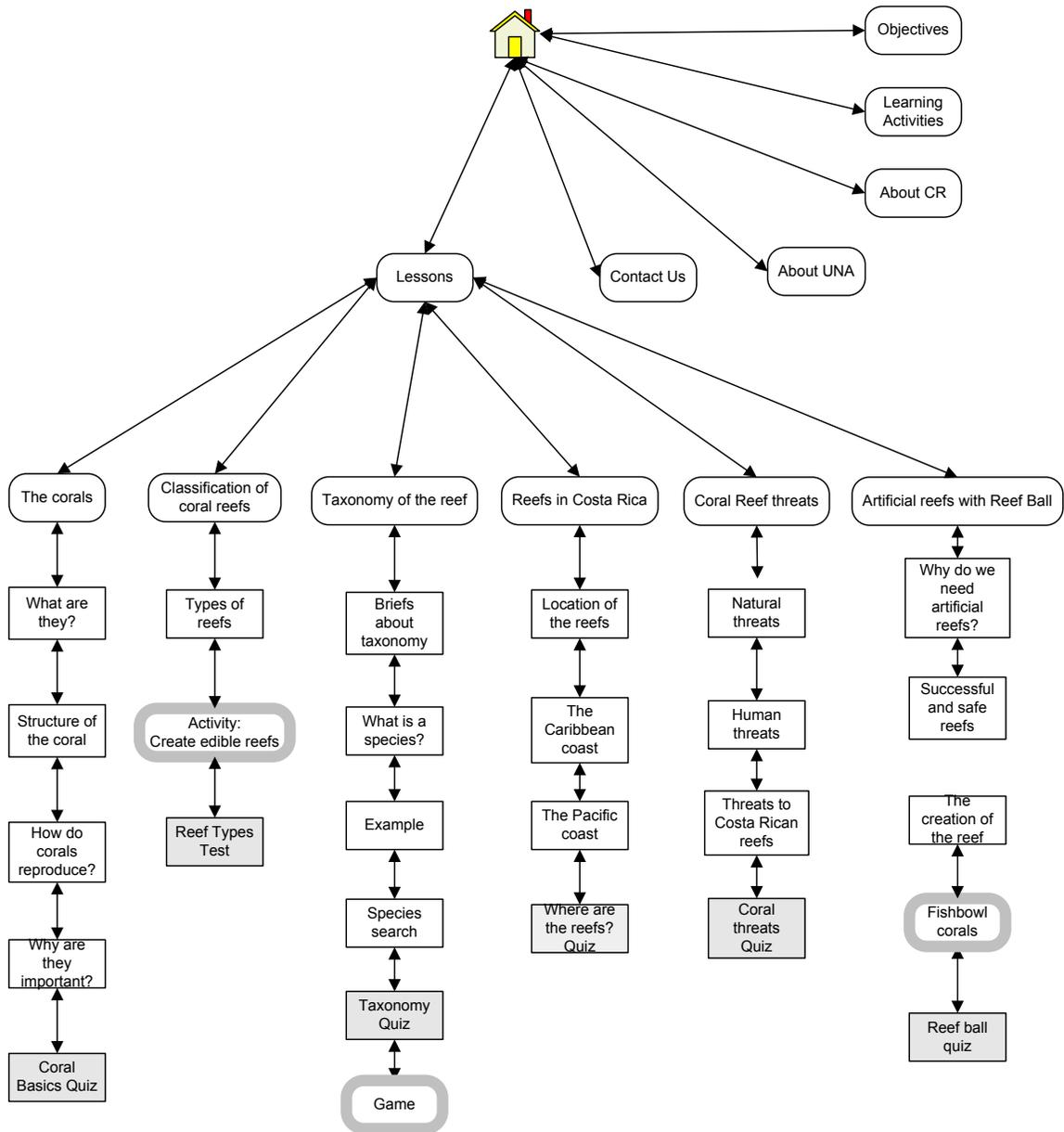
Coral Basics, Reef Types, Where are the reefs?, and Concrete Corals HTML

quizzes: These quizzes will only have HTML text and images. There will only be true-false or multiple choice questions in these quizzes. The questions will evaluate the student's knowledge about coral reef threats and preservation strategies in the first one and types of reefs in the second one. All the questions will appear in one screen. At the bottom of the test there will be a submit button. After clicking this button the user will be presented with the score and some feedback about his/her performance.

Flash Coral Gallery: The coral gallery is a collection of images of corals, algae and animals in the reef. This screen will have all the thumbnails of the images. When the user clicks one thumbnail the large version of that image will display in a new window.

Reflection questions: Every lesson will have reflection questions. This might not be highly technological features but I include them in here because asking questions to the user and making him/her think about something specific is an interactive and dynamic process.

Flowchart



Storyboards

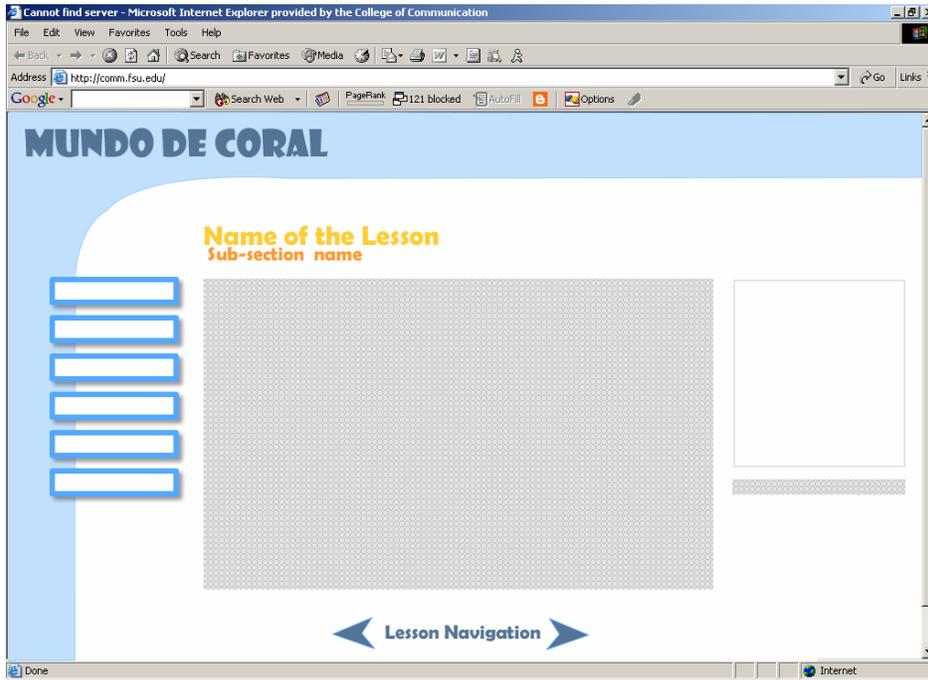
Main page:



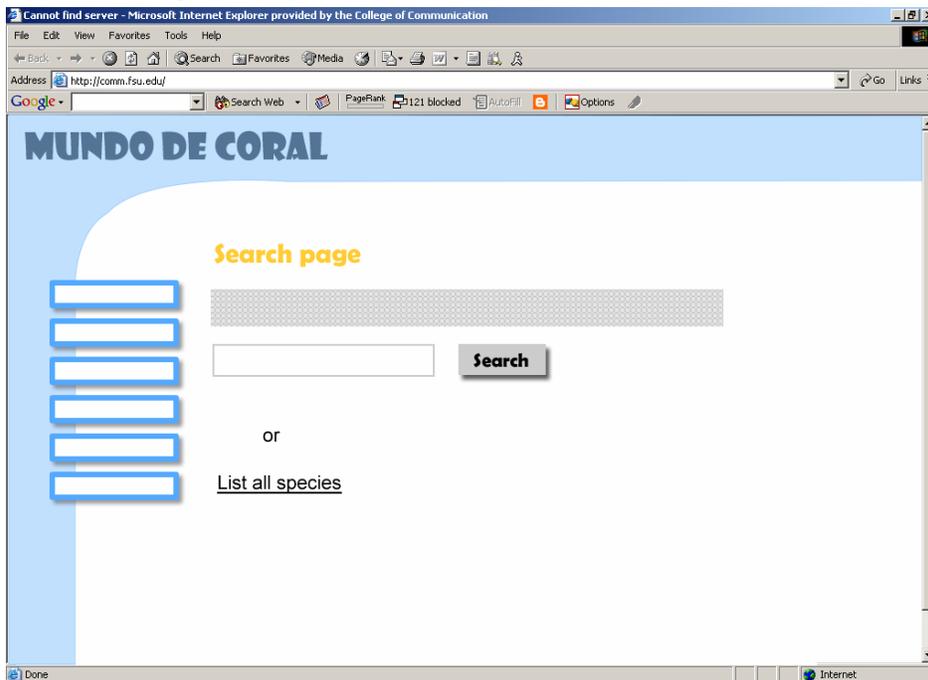
Second level page:



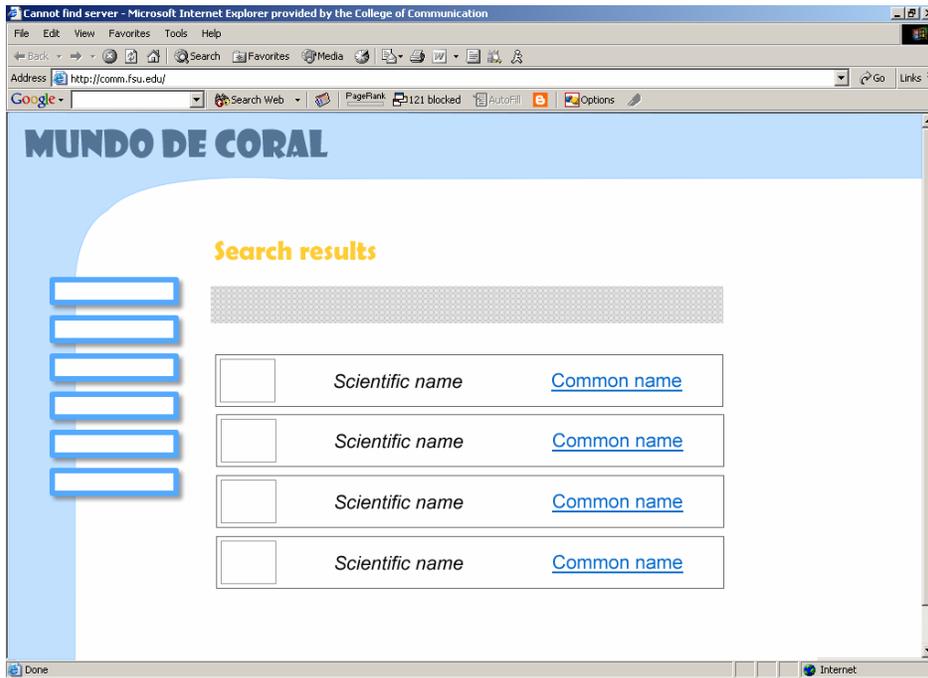
Lesson page:



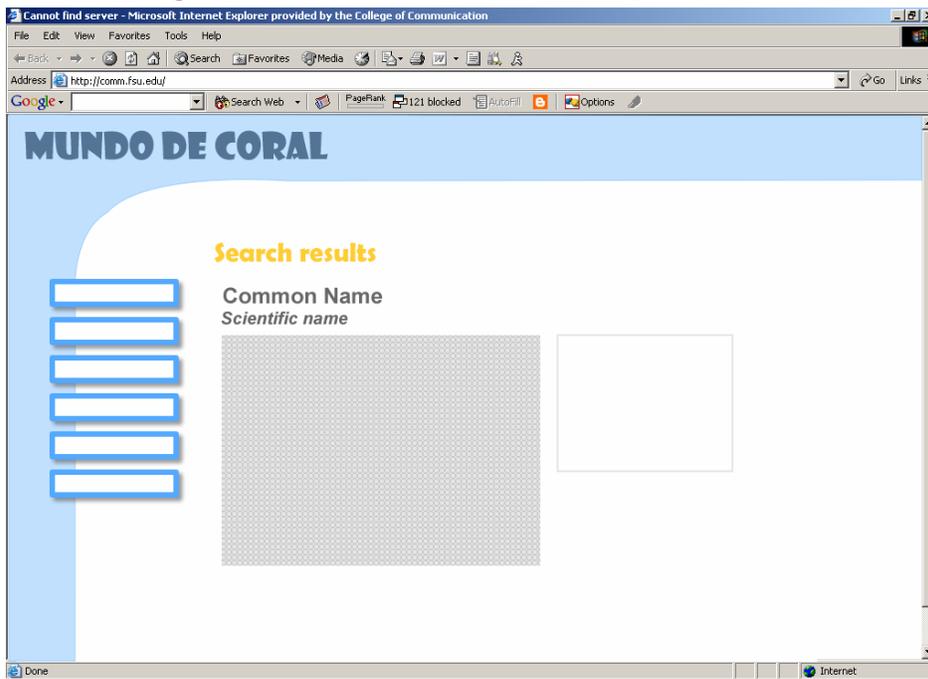
Search page:



Search results page:



Details page (of one of the results):



Navigation and user interface

The navigation of this website is non-linear and the user should be able to jump from any page to any other section on the website. A visual representation of the links would look like a spider web. Every page on the website (except for pages that open in a separate window, like external links or the pictures in the gallery) will have a menu that takes the user to the main 7 sections or options on the website: home page, ‘about Costa Rica,’ ‘About UNA,’ ‘Objectives,’ ‘Lessons,’ ‘Instructional Activities,’ and ‘Contact us.’

Global conventions

Button / Icon	Function	Comments
Navigation buttons	They take you to a specific section	This will be image graphics with text
Thumbnails	Opens a larger version of an image	This will be used in the image gallery
Hand cursor	Grab and hold objects	The cursor will change to a hand in games where the user needs to grab and drag objects
Interactive map	Links to content pages related to the specific area on the map	This resource will be used in the section about coral reefs from Costa Rica.
Process animation	Shows a step by step progression of a process	Used to show the creation of coral reefs
Interactive scenario	A scenario that has clickable objects and helps the user learn and evaluate him/herself	Used in the taxonomy quiz

Color specifications

Color	Color name	Hexadecimal #	Uses
	Blue	#6C8DAE	Header and page frame
	Blue-green	#9DD2C7	Header and table borders
	Light blue	#E1F0FF	Background for web pages
	Dark grey	#666666	Text
	Yellow	#FFCC33	Titles
	Orange	#FF9933	Emphasis, bullets, subtitles
	Dark aqua	#4A8271	Links

Text

The writing has to be direct and casual, because of the audience we are addressing. As in any digital message, the content should be precise, concise and direct. Short paragraphs will explain the concepts in plain every-day language.

Font specifications

Function	HTML description	Look
Logo	Showcard Gothic, 22	Mundo de Coral
Titles	Berlin Sans FB Demi, 24px, #5	Lorem ipsum dolor sit amet.
Subtitles	Berlin Sans FB Demi, 16px, #3	Lorem ipsum dolor sit amet, consectetur adipiscing elit.
Content and buttons	Arial, 2, 10pt	Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris.
Games	Arial, different sizes and weights	Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam,

Sound files

Sound file	Description	Function
game_music.mp3	Cartoon music, lively and playful but slow.	Memo game background music
trivia_music.mp3	Cartoon music, very fast and energetic.	Coral Basics trivia background music
correct.mp3	High pitch beep sound	Coral Basics trivia correct-answer clue
wrong.mp3	Low pitch beep sound	Coral Basics trivia wrong-answer clue

Button and Icon Design

Image	Function
	Logo
	Section Title
	Main navigation button (up state)
	Main navigation button (over state)
	Lesson navigation
	Back to the top of the page

Review of related Issues and Efforts

After doing a three-month research about coral reefs on the Internet, I found hundreds of websites, books, PDF files, magazine articles, videos and CD ROMS related to coral reefs. For the purpose of this analysis, however, we are only going to examine websites, CD ROM encyclopedias and computer games related to coral reefs that have been published in either English or Spanish.

There are also many published videos in VHS and DVD related to coral reefs, but they will not be regarded as relevant to this analysis because they are linear media. Only interactive multimedia will be considered in this discussion.

The list of material being examined does not pretend to be exhaustive, instead, I had selected the best multimedia products I had found to extract not only ideas for the visual design, but also for the content and organization.

Games

Some of the games I have examined so far that relate to coral reefs, ecology, or underwater adventures are:

- **EcoQuest** is a game for a young audience. The main character, Adam, is a 12 year old boy who has a Scuba diver license. The purpose of the game is to help him find Cetus, the whale king of Eluria. He also has the help his friend Delphineus, a dolphin that he and his father rescued from a fish net.

Publisher: Sierra	Year: 1991	Category: Adventure
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- [Insaniaquarium](#) is a fishbowl simulation where the user gets some eggs to start with and he/she is supposed to make the colony grow by taking care of the conditions of the fishes, feeding them and killing their enemies. Every level offers new kinds of fishes and challenges.

Publisher: PopCap Games	Year: ?	Category: Simulation
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- **Freddi Fish 5**

This is a role game for young children in which the user is supposed to guide Freddi and his friend Luther (two fishes) find the mysterious creature that has been lurking around the Coral Cove Park. The park is supposed to open in a few days so they need to hurry solve the mystery and hopefully scare the creature away so it won't interfere with the opening. To solve this mystery the children will apply logical thinking, problem solving, deductive and inductive reasoning as well as color, shape, number, and letter recognition.

Publisher: Infogrames	Year: 2001	Category: Adventure
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These games use color, sound and interaction to grab and keep the attention of the user. These are very engaging games that can keep children entertained for hours.

But what is most important for us is how the children actually learn or exercise some knowledge skills while playing. Eco Quest and Freddi Fish encourage children to remember locations and develop a good sense of location, children also learn to pay

attention to conversations (they have clues) and to details. They are also loaded with activities in which the users need to infer the use of one object or how to make two or more objects interact to achieve a specific goal.

In the 'Mundo de Coral' web site I will incorporate some of these strategies in the flash games. Sound will make the game more engaging and sound effects will give the user a clue about his/her performance. Colors will be bright to attract the attention of the user to the stage where the game is occurring (the game will be loaded in an HTML page with headers and navigation)

The games need to be very interactive. As in these games (particularly Freddi Fish) it is important to let the user interact with elements on the game that are not necessarily going to affect his/her score, but that are going to add interest to the scene.

CD ROM encyclopedias

- [Coral Kingdom](#) This CD ROM contains a collection of underwater photography to illustrate a thematic approach to the study of reef biology, marine ecology and biodiversity. The content is organized into four major units: Adaptations, Ecosystems, Interrelationships and Human impact.

Publisher: Digital Studios	Year: 1996	Category: Encyclopedia
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- **Coral Reef: a living wonder** “This exciting program journeys to the coral reefs of the Pacific and Caribbean to show how tiny animals called coral polyps survive and how they build the largest structures on earth”.

Publisher: Aims	Year: ?	Category: Instructional
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- **The living reef:** This title features the Great Barrier Reef, its location, and main structures. The great photographs take you in a virtual trip to the undersea landscape of Australia.

Publisher: Aims	Year: ?	Category: Instructional
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- **Coral Reef! The Vanishing Undersea World** This CD ROM is structured in sections about specific subjects, like taxonomy, stories, picture galleries, media and ecosystems. The graphics are great but the navigation and interactivity are not intuitive or easy to use. And there are many ways to get the same results, in other words, you might find the same graphics and videos in different sections.

Publisher: Arnowitz Studios	Year: 1995	Category: Encyclopedia
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- [Scuba Dive Section](#) This website has a broad listing of multimedia tiles related to coral reefs and under sea life in general.

The CD ROM encyclopedias are a great source of ideas on how to present information in an interesting and fresh way. They have the challenging task of presenting raw facts and concepts in a way that captures the attention of the user. To achieve this goal, the examined titles employ some techniques that we are going to benchmark in the 'Mundo de Coral' website.

Coral Reef! The Vanishing Undersea World uses a clickable watercolor painting (image map with hot spots) as the main menu of the CD to create an interactive landscape. The negative side to this menu it relies in the interest and memory of the user, because only when he/she rolls over a hotspot will he/she receive a clue saying that this is a link to something else. We are going to use this strategy in the Costa Rican maps to let the user know where the main coral reefs located in Costa Rica are and make it obvious that they can click on the icon of the coral on the map to learn more about that particular reef.

These titles also feature beautiful collections of photographs. But picture galleries alone are a good way of wasting time, and descriptions without photographs tend to be boring and little instructive. These photo galleries are useful when combined with information about the species in the picture so that it's easier for the user to recall the description of a species in reference to a picture.

Some of these CDs also have learning activities to engage the user in an interactive auto evaluation. Games like trivia are a fun and useful way to assess the retention of specific concepts.

Another resource commonly used by these encyclopedias is to have short blocks of text and voice-over narrations. These CDs should be fun and we want the user to make as little effort as possible. The learning process should be smooth and easy. According to recent studies (Vaughan 2001) adding audio and sound to a presentation can increase the retention in up to 60%. It is very hard to incorporate voice narration to web pages without increasing the file sizes too much. Besides, not all users have speakers or headphones attached to their computers or turned on all the time. For these reasons we will focus on making the texts blocks concise and to the point, relying in many occasions in images to explain hard to grasp processes and concepts. Audio explanations or feedback could be incorporated as small clips in the flash games.

Websites

While collecting information, pictures and instructional strategies, I have found a collection of educational websites about coral reefs these are the most important ones:

- [Reef Ed](#) Educational website of The Great Barrier Reef Marine Park Authority.
- [Reef Base](#) Premier online information system on coral reefs, and information services to coral reef professionals.
- [Action Atlas](#) Digital article about endangered coral reefs around the world.
- [Coral Reef Alliance](#) The Coral Reef Alliance is a member-supported, non-profit organization dedicated to keeping coral reefs alive around the world.

- [Newsround](#) This educational website developed and supported by BBC is a portal about scientific subjects for young audiences.
- [Explore the coral reefs](#) This is a website designed by educators who integrate technology in the curriculum by developing inquiry-oriented, standards-based curriculum units. The lessons are based on the WebQuest model developed by Bernie Dodge, project consultant and Professor of Educational Technology at San Diego State University.
- [Reef Education Network](#) Educational website developed by University of Sydney and Tech Talk Australia.
- [Corals and coral reefs](#) Web-book developed by Bush Gardens and Seaworld about corals and coral reefs.
- [Coral Reef Adventure](#) Promotional website for a documentary video about coral reefs. Besides information about the screening of the video, the website offers learning activities, games and teacher study guides related to coral reefs.

Most of these websites use a blue background as a metaphor for the underwater environment. This is not a very innovative idea, but it works well because every website was applying the metaphor in its own way and the user almost expects it.

The informational websites like Reef Base are a great source of information, but they are so crowded with text that is sometimes hard to find specific subjects. The design is not attractive and the long crowded pages with small grey text over white background are less than inviting, particularly for young audiences.

The News Round website from BBC is colorful and loaded with icons, options, rollover buttons. In this website designed for young audiences almost everything is clickable. The page has bright colors to engage the users and lots of pictures to illustrate concepts. This is an educational website that not only instructs about coral reefs (actually they only had an article) but there is a lot of ideas that can be taken from them about motivating and holding the users in their website, besides the colors and animations, the names of the buttons and options are funny and creative.

The News Round (NR) website as well as the Reef Education Network (REN) have a casual writing style that goes straight to the point. Ideas are clearly expressed in short paragraphs and images are used as visual aids to improve the understanding of the concepts presented. Unlike these websites, the Sea world books present long pages of text with very scarce pictures over a white background. Perhaps these pages could work fine for printing them, but they definitely look dull, long and boring on the computer screen. And if they were meant to be printed, it would have been better to create a PDF file with a friendlier format. If 'Mundo de Coral' wanted to offer online books later on, we would use the PDF format rather than the HTML pages to be able to better control the outcome of the publication.

Although the information presented in these books from Sea world is very valuable, thorough and interesting, the way in which is being presented might dissuade some users to read it.

The REN website, on the other hand, has a lot of problem with the design. Their pages are long and the text runs page wide, this, along with the colorful backgrounds makes it almost impossible to read it. A positive aspect of this website is how they created a

section to explain the taxonomy of the species that inhabit the coral reef and they organized all this information according to the taxonomic classification. We will follow this organization or at least build upon it, to create the taxonomy section of the 'Mundo de Coral' website.

The Coral Reef Adventure website was primarily built to promote a movie about coral reefs in the Southern Pacific Ocean. But this website became a great source of information and entertainment for young and not-so-young audiences. The layout is formal but it has lots of flash movies that add dynamism to the pages. Some of these flash movies use still images inside movie-clips to animate them and reproduce a lively scene. This is a clever resource that we plan to utilize because it will allow us to create video-like movies with still images. They also have a fun zone with games that not only entertain but also teach, and best of all, the games offer different levels of difficulty so that not only children will enjoy them.

The purpose of this review is to collect good examples of visual design as well as content organization to serve as a basis for the 'Mundo de Coral' website, and at the same time, avoid some problems common to some websites, mainly related to the layout design.

We intend to create a high quality website that will be attractive not only for our main audience but also for all those people young and old who are interested in learning about the coral reefs.

Time Schedule

Task Name	Duration (hours)	Start Date	End Date	Notes
Design				
Define scope of the project	2'	Jan 19	Jan 19	
Design sections and organization	1'30"	Jan 19	Jan 19	
Audience analysis	30"	Jan 21	Jan 21	
Background information	2'30"	Jan 19	Jan 20	
Flowchart	3'	Feb 24	Mar 05	
Storyboard	2'	Feb 20	Feb 20	
Layout	5'	Mar 02	Mar 21	
Icons, buttons and graphics	3'	Mar 15	Mar 20	
Games	5'	Apr 10	Apr 11	
Create and populate database	3'30"	Apr 29	Apr 30	
Cold Fusion Pages	4'20"	Apr 29	Apr 29	
Research				
Collect Images	7'	Jan 10	Mar 20	
Find related websites	8'	Jan 10	Mar 17	
Find related CD ROMs	6'30"	Feb 4	Feb 24	
Evaluate available technologies	1'30"	Feb 13	Feb 13	
Gather content	12'	Feb 17	Mar 12	
Project Proposal				
Write background document	1'20"	Jan 21	Jan 23	
Present Concept Document	2'30"	Feb 15	Feb 20	
Write Audience analysis	30"	Jan 21	Jan 21	
Technology Assessment	1'30"	Feb 5	Feb 9	
State objectives for the project	2'	Feb 10	Mar 17	
Design specifications	3'	Mar 27	Mar 27	
Related efforts	4'	Feb 24	Mar 17	
Revisions	2'30"	Mar 31	Apr 6	

Project Review

In the process of imagining, planning and developing this website I went through a long cycle of changes and adaptations. Some ideas that inspired me at first turned out to be impractical and I had to reject them. But at the same time, new ideas were coming, and the more I was learning about the subject matter, the more and better the ideas I was having.

The process of creating this website thought me a lot about coral reefs and computer technologies for the web, but I also learned about the multiplicity of aspects related to the management of a project.

These are some of the things that changed in the process of creating this website:

- The layout: In my experience the design of the layout is one of the tasks that take more time. I browse dozens of websites to get ideas for the look and feel of my website. I paid attention to buttons, icons, colors, borders, animation and interaction. After collecting some ideas I started experimenting on my design. I created three different layouts and I learn a little more with each one of them. With the last one I just had to change the colors and refine some details until I was satisfied.
- The quizzes: I planned to have Flash and HTML quizzes. At first I was trying to learn dynamic HTML and JavaScript to create the quizzes. Fortunately, after some research I found a plug in for Dreamweaver called 'Course Builder' that makes the creation of HTML based test fast and easy. This helped me gain some

time in this process so I could work in the creation of other interactive features, like the database.

- Browsers: Making the website Netscape-friendly took me a lot of time and was a very frustrating process. After my pages were ready and running smoothly in IE I found out that Netscape was changing the appearance of table borders, table sizes and the location of images. It took me a lot of time to fix these problems.
- Data Base: From the start I wanted to have a database about species in this website. However, when I wrote the proposal I didn't include this feature because I was afraid I wasn't going to have the time and skills to build it and create all the cold fusion pages. Fortunately I came out with a simplified idea for the database that was doable and the creation of the database and the cold fusion pages took me a lot less than I was expecting.
- Flowchart: I change the flowchart at least three times because the number and content of the pages kept on changing as I designed the website.
- Revisions: The reviews by the content editors (two marine biologists from UNA) were very useful but also gave me a lot of extra work. Their function as subject matter experts was to point out inconsistencies in the information, grammar and spelling errors and to locate and send me images and information that I couldn't find anywhere else.

Besides all the changes I already made to 'Mundo de Coral' there is a long list of improvements I would love to do.

I want to make changes to the 'Memo' game to make it more meaningful. I want to replace the piranha with a real threat, like a bigger fish, and the rocks with old tires or other objects that could represent the pollution on the reefs. Another feature I could add to this game is food for the little fish, so the user learn how difficult it might be for a fish to eat while trying to avoid the dangers of the reef.

The database has less than forty species and it still doesn't include fishes and crustaceans. I want to add species to the database so that the user would find almost all the species that exist on the Costa Rican reefs.

I know I could add more lessons and a lot more flash games and quizzes. I have many ideas for new games, simulations and tests, unfortunately, the time constraint didn't let me develop all the ideas I have.

At this point I feel that the list of things I want to do is bigger than the list of things I have accomplished (due to time limitations). However, the presentation of this project doesn't mean the end of 'Mundo de Coral'; this is just the conclusion of the first phase.

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