Using the Web to Foster Project-Based Learning in an Environmental Science Curriculum

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Overview

The following paper describes the development and testing of an applied research project. This paper will document the initial motivation, the influencing factors, and the design rationale of an Internet-based environmental science activity. Following this, the results of a formative evaluation of the activity will be disclosed. An analysis of the data will then be used to generate design recommendations for a future release of the activity.

Introduction

The emergence of the Internet into our society and culture has created new opportunities for education. Having penetrated over 25% of the US population in only seven years, the Internet has reached more individuals faster than the radio, the telephone, the television, the cell phone, and even the personal computer. Many researchers have been investigating the affordances of the World Wide Web and its use as a research tool for students and its affordances for project-based learning. Consequently, many recommendations and design strategies for the construction of WWW learning environments have emerged.

This case study adds to the continuing study of the Internet as a research tool for education by looking at the educational and technological possibilities of using the Web as a medium for students to research and publish work. This study will look at how Web-based educational software can be designed to support project-based learning, and look at the technological affordances of the World Wide Web as a medium for such projects.

It will do this by designing and testing a singular Web-based activity. This study will cover the design and testing of this activity, which has students create web pages on plant/animal diversity in deserts. This study includes a formative evaluation, which will be used to improve the next revision of the software.
The structure of this paper will be exposed by first describing the motivation for constructing an environmental science activity. From this, the educational goals of the software will be presented. Then the factors influencing the design will be discussed. The inputs include current research and advice received from an environmental science expert. Following this will be a description of the software's design, functionality, and educational goals. Then this case will discuss the interactions of three users with the activity. The backgrounds and feedback from the users will be analyzed and used to formulate recommendations for modifications in the software's next revision. Finally, this case will conclude with recommendations for other studies that need to be conducted to further inform the design of the software.

**Motivation**

Traditional approaches to environmental issues emphasized confrontation, emotionalism, political ideologies, and ancient myths about nature. Modern approaches to environmental issues have taken a more scientific approach. The study of environmental issues has become a multidisciplinary scientific endeavor. In order for students of environmental science to understand the larger issues of human population, sustainability, urban effects, etc. they must understand the environment in terms of its biology, chemistry, genetics, geology, ecology, climate, and others. Thus, teaching students environmental science involves helping them understand connections between these seemingly disparate disciplines and their connections to global environmental issues.

To better understand the type of instructional intervention and scaffolding that students will need to understand environmental issues in a multidisciplinary way, high school students in an environmental science class were asked a question that related to animal/plant diversity in deserts. I asked thirty-seven students in a high school located in an affluent neighborhood of Northern California to provide factors that cause animals and plants in one desert to differ from another desert. This question involved factors from a wide range of disciplines. The question specifically focused on plants and animals in two different deserts, because I wanted students to focus on the factors that differ amongst deserts.
Satisfactory answers to the question would have included a discussion of climate, geography, ecology, and evolution/genetics. The results, however, revealed that only two-thirds of the students wrote down at most two of the relevant factors and only 5% of the students were able to draw on all four factors. More interestingly, the evolution/genetics factor appeared in only 19% of the students' responses, despite the fact that all of the students had taken at least two semesters of biology as part of their high school curriculum.

![Bar chart showing factors that play a role in plant/animal diversity among different deserts](chart.png)

<table>
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</tbody>
</table>

Categories mentioned in responses

Ideal response
Educational Goals

These results motivated the construction of an activity that will help students analyze environment-related issues from a multidisciplinary point of view. The activity's goal is to teach students that many observable characteristics of plants and animals are actually the result of factors that cross multiple disciplines and domains. In the activity, students will learn about specific species and the different factors that influence their observable differences. The goal is to understand how the different factors, such as soil conditions, water availability, etc. influence the diversity in plants and animals in deserts. Using a Web-based environment that allows students to make available their findings to other students, the activity promotes the understanding of these factors from multiple perspectives. In a typical classroom environment, students must make copies of their work for each classmate with which they wish to share. The Web inherently allows many students to view the same page at once without the need of making copies. It gives them an opportunity to learn about their desert diversity from the perspective of two plants or animals, while also allowing them to see these factors influence other plants and animals. This will give students a global understanding of how these factors effect desert diversity.

The activity is an introductory lesson to the subject of evolutionary adaptations. Subsequent activities and lectures that the students should encounter would explore more detailed diversity issues. For example, a subsequent exposure to metabolic adaptations of plants such as C4 and CAM, would give students a more scientific understanding of some of the morphological adaptations they might have discovered in this activity.

Though the motivating factors for the design of this Web-based activity came from students of a secondary school, the activity is intended to be used by secondary and post-secondary students. As an introductory activity that holds few prerequisites, this activity is designed to be integrated into either a high school or a college environmental science curriculum.
Influencing Factors

As stated in the problem, the widespread availability of the WWW, as a resource for students, is a key impetus for this study. After looking at what affordances researchers have discovered, this study will look at the available research on project-based learning to gain a clearer picture of what skills and learning goals are inherent in a project-based activity. This information will be used to inform the design of the activity.

Technological Affordances of the Web

The term affordance was first used by Gibson (1979) and comes from the psychological literature on the field of perception. A perceived affordance is a potential interaction between an object and a person. Affordances are neither properties of people or objects, but are properties of the ecology of actions and objects (Gibson, 1979), which by necessity includes both.

By virtue of being a multimedia environment, the Web allows multiple media to be combined to communicate information in new ways. Kozma (1991) wrote about how combinations of media types can be used to aid learning. Paivio (1996) further supported this with his dual coding theory. This theory suggests that two complementary representations are better than one, which the Web surely provides.

Animations and video supported by the web also provide new affordances to education. Mayer (1994) discussed how animations may be superior to a series of diagrams, and Kozma (1991) found that audio and video paring often lead to increased post-recall.

As a hypermedia resource, the Web allows for new ways to store, capture, and navigate information. Hypermedia refers to information that is organized and accessed in non-linear ways. Feltovich, Coulson, & Spiro (1996) discovered that hypermedia learning environments promoted students’ cognitive flexibility, which facilitated their understanding of ill structured systems, because it allowed students to ‘cris-cross’ landscapes of information.
Hypermedia, such as the Web, also supports constructivist education models by giving users control over the sequencing and duration of information presentation (Bos & Krajcik, 1998). Carver, Lehrer, Connell, and Erickson (1993) had students create their own non-linear hypermedia stacks and discovered that a year later students who had worked in the hypermedia environment had significantly more retention of their projects’ subject matter than matched peers in a more traditionally taught class.

The Web affords access to vast amounts of information in the form of on-line databases that students can search with keywords. However, when using such systems, students become absorbed with the process of searching and often neglect other important aspects of information-seeking process, such as critical evaluation (Bos & Krajcik, 1998). Kulthau (1993) proposes a solution to this cognitive overload experienced when students use the Web by laying out a deliberate sense-making process for students to follow. Also, because the Web is a distributed information system with no central authorship, it affords students becoming authors as well as users of knowledge (Marchionini & Maurer, 1995).

**Project-based Learning Theory**

The affordances of a new technology are most powerful when they are matched with a well-developed set of educational goals (Duffy & Jonassen, 1992). The set of educational goals and technological affordances mentioned above seem most related to those of project-based learning. Project-based learning was chosen as a theory on which to base the software’s activities because much success has been achieved in supporting scaffolding of project-based learning with technology.

Project-based learning initially defined by Blumenfeld, Soloway, Marx, Krajcik, Guzdial, & Palinscar (1991) is a model for constructivist and inquiry-based curriculum. Artifacts produced by project-based activities provide various educational advantages.

Artifacts, particularly computer-based artifacts, allow students to create new representations of their knowledge such as dynamic models and hypermedia (Lehrer, 1993). Artifacts of project-based
learning can also be a means of communications when students create artifacts that are used to support learning of other students. (Bos, Krajcik, & Soloway, 1997).

According to Scardamalia & Bereiter (1991), project-based learning should put students into higher levels of agency that was previously common in schoolwork. Also in project-based learning, students are encouraged to ask their own questions, perhaps as sub questions that help drive the main question (Krajcik, Blumenfeld, Marx, Bass, Fredricks, & Soloway, 1998).

Learning higher level thinking skills is another goal of project-based learning. Callison (1993) claims that the diverse resources available on the Web will teach students critical evaluation skills. Projects involving hypermedia, such as the Web, according to Lehrer (1993) are often ill-structured, which require students to invent representations and be creative over what they will include in their project. Additionally, the high-level functions of self-regulation is needed by students in project-based activities because they need to manage their time and process in order to reach their goals (Carver et al., 1992).

The data gathered above suggests that there are many ways for technology to scaffold project-based learning. With this information in the backdrop, the next design step of the software was to solicit the advice of a subject matter expert.

Subject Matter Expert

A subject matter expert was interviewed to help transform the design into an activity that properly introduced students to the diversity of plants and animals between different deserts.

The subject matter expert was a PHD in Field Biology. She will be referred to as Dr. Green. Dr. Green was an ideal expert to consult because she had taught environmental science for the past ten years. She is currently a question writer for the Advanced Placement Environmental Science and has been developing curriculum for environmental science courses for the last eight years. Dr. Green provided many valuable insights that greatly influenced the design. She provided four main insights
which were: anchor instruction in realistic settings, provide time for reflection, support curiosity about content, and negotiate for learning tasks.

Dr. Green claimed that by giving learners an authentic environment and by giving them real settings to work with students would be more motivated. One of the difficulties that she has in her own class and many other environmental science teachers have in high school classrooms is motivating students to want to learn about deserts and the plants and animals within them. Giving students access to real data and a legitimate environment in which to publish their work will help increase their motivation. From this, it became apparent that the software needed to provide students with real information about plants and animals and possibly allow them to author their work on the web.

When asked about how the proposed activity would be used in later learning of environmental science, Dr. Green responded,

Knowledge about desert diversity comes up again in bio-diversity crises and adaptations of evolutionary time. Students need to be able to recognize how plants and animals adapt to desert climates in order for them to understand evolutionary processes. Once they learn this, they will understand that evolutionary changes take a long time. Things are changing faster than evolutionary time. This is why bio-diversity is dwindling. Students should be given ample time to reflect on their desert diversity findings so that they can make the inference they will need to make when they are called to understand the bio-diversity crisis.

As a result, the design of the software calls upon students to reflect on their answers and indicate why they have made the decisions that they make in the software.

Another important insight that Dr. Green provided to the design was the notion of supporting curiosity about the content. She said that if the software gave students open-ended questions with multiple correct answers it would promote contradictions that would foster discussions. In her twenty years of teaching, she said that getting students to engage in discussions was often very difficult to do, but when she managed to get one started, students would learn a lot. This was true for her high school students as well as her college students. From this, the software was designed to provide students with many choices that were open-ended.
Dr. Green noted that traditionally students were taught desert diversity through a lecture and sometimes a video. This did not allow the student to negotiate for the learning task that fit their needs or interest. She said desert diversity is a very rich subject matter and there are enough examples of it to allow students to pick the approach they want to take to learn about it. It became apparent from Dr. Green's suggestion and the research above that the software would need to give the students autonomy in their searching.

**Design and Functionality**

Using all three input factors, the design of the software environment and the activity became concrete. The following is a description of its design and functionality.

**Design**

The activity is Internet-based and requires students to generate a web page that describes how desert conditions affect the plant and animal diversity within deserts. Through this process, students will be exposed to the multidisciplinary factors that many students failed to mention in the motivational study above. The approach is to have students look at two specific species, either plants or animals, from two different deserts and compare and contrast the factors that contributed to their differences. By taking a micro view of diversity and focusing on two specific species, the student will get an opportunity to see how multiple disciplines interact and contribute to the diversity seen in different deserts. Once the student completes this aspect of the activity, his/her work is presented on the World Wide Web so that other students can view the student's work. This allows students to understand desert diversity from a macro perspective that will aid in their learning of environmental issues.

The curriculum used in the activity involves plant and animal species from three different North American deserts, the Mojave, Chihuahuan, and Sonoran deserts. The students must choose whether they are going to compare two plant species or two animal species. Next, they must choose what two deserts they are going to use for the investigation of plant or animal differences. Then the student
chooses the class of species they wish to compare. This includes classes such as mammals, reptiles, birds, and insects for plants, and trees, shrubs, and cacti for plants. Presented with a list of species, the students then compare two different species each from a different desert that they chose earlier. Then, the students are given a list of resources that have been pre-selected from the Internet, which provide information about the species they selected. The resources are web pages that provide textual and pictorial information about each species. The web pages are external to the activity and were not written for the purpose of this activity. The resources can be readily found using standard search techniques and expose student to a realistic environment where they must assess the quality and content of the resources because they use it to compose their report.

Functionality

The activity presents to the user a four-step process: plan, decide, research, and create. These steps scaffold the students' learning and helps them structure their decision making process (Appendix I).

The data gathered from the study mentioned above predicts that most students will pick deserts with greatest difference in climate and geography because many of them believe to be the only factors involved. In order to scaffold the students and make them realize that other factors are influential, the activity requires the students to engage in a planning phase before they are prompted by the system to decide on which animals or plants to compare. Students are required to perform a cursory examination of the available resources before they make a decision.

After a student has done his/her planning and has decided on two species for which there is adequate information and interesting factors to compare, the software asks the student to indicate in their report why he/she has selected those particular species. This encourages the student to defend his/her decision as well as make the student reflect on his/her planning. Once a student has committed to two species that are from different deserts, he/she is presented with a form that provides categories of topics for which the student must write about similarities and differences between their species. These categories serve as prompts that ask the student to examine factors that he/she might not have
considered, such as evolution/genetics (Appendix III). At the same time that this form is presented to the student, a page with resource links to the student's species is presented on the screen so that the student can do an in-depth reading and research on the species before completing the form. The categories on the form help the student look for factors in their resources, which he/she may not be familiar. At this phase in the activity, the student is simultaneously engaged in the research and creation part of the activity.

The prompts scaffold the students’ reading and research of their species. Especially since the prompts are different for animals and plants, they call upon the student to notice more detailed and subtle differences/similarities between the species. With both the resource window and the form window on the screen at the same time, students have view and access to the issues they need to investigate while they are examining their resources.

For each similarity and difference that the student writes about, he/she is prompted by the form to indicate why that similarity or difference was interesting. This helps students reflect on their work and helps stimulate their meta-cognitive processes. The form provides places where students can link images and other drawing of their species that they discover during their research. This will allow students to express their findings in multiple media formats that will facilitate learning as well as help them convey their findings to other students.

Upon completion of the form students click a submit button which then formats their work and generates a web page. The web page is then put on a server where the student, and anyone else for that matter, can view their report. This public format is designed to allow other students to view the work done by their cohorts and give them a more global perspective on how various factors affect other plants and animals in deserts. The Web makes sharing simpler than having the students make copies of their work for all of their classmates.
This Web-based activity uses the Web as a means for the student to do research and as a way for them to publish their work. It does not require the students to know how to create a web page because the software generates one for them. The students are only asked to provide the content and links to pictures. The student is not burdened by the tedious details of formatting and writing Hypertext Markup Language tags.

The Formative Evaluation

Three students tested the activity. Since the activity is designed to be used by secondary or post-secondary students, three post-secondary graduate students were selected. Two of the users were male, who will be referred to as Mike and John, while the third user was a female and will be referred to as Karen.

The users were given 35 minutes each to expend on the activity. They were notified of their time constraints at the beginning and were told to keep track of their time throughout the activity. Due to the limited amount of time, the users were told to fill in at least one similarity and one difference between their species for one of the prompts on their form.

Three main areas of measurement were of interest for this study. The areas included: evaluation of the scaffolding steps used to aid the students' selection process, evaluation of the students' understanding of different factors that contribute to desert diversity, and overall navigation clarity of the software.

Instruments and Methods

The students' learning was evaluated using a pre and post-activity question that helped assess whether the activity improved the students understanding of how multiple factors influenced observable phenomena in deserts. A pre-activity survey and interview was administered to find out relevant background information. Students' interactions with the software environment were tracked using Web
server log files that helped evaluate what pages each student encountered, how much time they spent on each page, and how that might have influenced their learning and impressions of the activity. Post-activity surveys were also administered. From this, information was gathered on the students' first hand impressions of their own learning and their impressions of the scaffolding help that they were given while choosing their species. It also asked for the students' impressions of the activity's usability. The web sites created by each student were also coded for the number of factors that relate to desert diversity. This helped to compare the results of the post-activity question with what the students wrote in their web page.

User Selection

All three users were selected using two criteria. The first criterion was that the students had to be relatively unknowledgeable about deserts and environment related issues. This was to prevent subject matter expertise from influencing the scaffolding provided by the software. The software activity was designed to introduce unknowledgeable students to plant/animal adaptations in deserts, and therefore it would be impossible to assess the software's scaffolding techniques if the user did not use them because of prior subject matter knowledge. The second criterion of the study was to test a user group that possessed a wide range of computer expertise levels. The rationale for this was to ensure that the comments received from the users about the navigation and interface of the software were representative of a diverse population. Since this software activity eventually will be incorporated into a curriculum, it was necessary that users of all computer expertise levels were tested.

Findings

User Profiles

In order to better understand the analysis of each user's interactions with the software, a look at each user and their backgrounds is essential. Using a combination of a pre-activity survey and interview, the users backgrounds were gathered. Both Mike and John were selected from a top-ranked university where they are pursuing a Masters in Education and a PHD in the History of Science, respectively. Karen was selected from a reputable law-school where she is completing her studies for a JD.
In both her secondary and post-secondary studies, Karen noted that she had taken approximately five science courses. She claimed that her exposure to science was not out of choice but rather out of obligation to satisfy her high school and college breadth requirements. Her exposure to topics related to environmental science such as evolution, geology, climate, and ecology had been minimal in her education. These topics were covered in a very cursory fashion in at most one or two of her classes. Her limited experience with computers solicited a response of "I know something about computers," which she further explained to mean that she was familiar with them, but would not consider herself an expert or guru user. Her inexperience with computers was also reflected in Karen's use of the Internet. She claimed to only use the Web about four hours a week.

Mike's background, in many ways, was highly contrasting to Karen's background. His comfort with computers was very high. He considered himself a guru of computers and the Web. Mike indicated that he used navigated the Web over thirty hours a week. In terms of general science knowledge, Mike indicated that he had taken approximately nine science classes during his secondary and post-secondary studies. His interest in science was relatively high, but his exposure to environmental science and related topics was similar to Karen. Mike had only encountered the topics of geology, evolution, climate, and ecology, two or three times in courses he had taken in the past.

John's background and experience cast him as an ideal user of the software activity. Like Mike and Karen, John had rarely come across topics related to desert diversity and environmental science in his studies. His science background was extensive in other areas of science such as biology, chemistry, and physics, since he had taken over 15 classes related to science. John felt that he was proficient in using a computer, but emphasized that he did not feel like he was an expert in them. His use of the Internet rested at about twelve hours a week. John's lack of desert knowledge and his moderate comfort with computers makes him an ideal student to use the activity.
Understanding Desert Diversity

Each user was given a pre and post-activity question to grasp their understanding of desert diversity. The question asked users to describe the factors that would lead to adaptations in deserts. All three constituents were able to mention twice as many factors at the end of the activity than before it. However, only Karen was able to bring in all four categories into her response.

Evaluating all three users’ web sites however, revealed a different story. Mike and John's web site only had mention of one factor, but they mentioned at least two factors in the post-activity question that did not appear on their pre-activity response. In the user survey, both Mike and John indicated that they did not have enough time complete the activity and indicated that they would need an average of 15 additional minutes to complete it. Karen finished on time and was the only one to mention all four factors in her web site and in her post-activity question (Appendix II).

Though time was a limiting factor in carrying out the steps of the activity, but it seemed to be adequate enough for the students to learn about the different factors that are important for desert diversity. This deduction was supported by data from the web. They showed that both Mike and John spent an average of 72% if their time on the planning aspect of the activity. During this, John looked at 33% of the available resources on plants and animals, and Mike looked at 38% of the available resources. This means that both of them looked at roughly 45 different species of plants each. The significance of this is that Mike and John were able to learn about multiple factors that contribute to desert diversity despite the fact that they were only asked to look at two plants or animal species, and despite the fact that they did not complete the activity. The scaffolding of step of planning encouraged Mike and John to look at a variety of species before deciding. This encouraged Mike and John to explore many factors while it simultaneously helped them focus on two specific species.

Scaffolding Steps

Steps were provided in the activity to help scaffold the students' research of their species. Though all three users agreed that the steps were helpful, only Karen adhered to the steps in a time
efficient manor and was able to use the steps to help her complete the activity within the period allotted. Karen's computer experience was significantly less than Mike's or John's, yet Karen was able to use the scaffolding steps more effectively than the other two. John indicated that he disliked the extensive amounts of directions that were given with each step. Consequently, he felt that while they were helpful, he did not take advantage of them.

The planning aspect of the activity was lauded by all three users who all said that it was valuable in helping them make their decision. As mentioned above, both Mike and John misallocated their time and placed a large emphasis on the planning phase, which resulted in them not completing the activity. From the web server logs, it is evident that both Mike and John were much more autonomous in their investigation of possible plants and animals than Karen. The logs show that John did not use the matrix structure to peruse what plants or animals he could chose. Instead, he followed hyperlinks within the resources during the planning phase of the activity. Mike, however, did use the matrix for his planning, but like John, he mismanaged his time and did not leave enough of it for him to finish the assignment.

Though all three users showed an increase in learning of desert diversity, only one of them completed the activity. The scaffolding succeeded in educating the students about desert diversity, but it failed because it did not help the students achieve the goal in a timely manor. This suggests that the scaffolding might need to be altered depending up on whether an advance more autonomous user is interacting with the system or whether a novice is engaged.

**Navigation**

Data on the usability and navigation of the site was gathered from the post-activity survey. Mike found the navigation of the site to be rather difficult. This was contrasting to Karen and John's positive experience with the interface. These results were rather confounding because Mike was the most experienced user and yet he found the interface to be the most problematic, while Karen, who was least experienced with computers, found the interface highly usable.
Mike felt that the high level of structure to the activity was too constraining. He did not like the form he had to fill in order to create a web page and would have rather constructed the web page himself. He also felt constrained by the small input boxes in which he was supposed to write down his answers. He said that the interface lacked many of the common tools such as a spell checker, which he felt was necessary if he was to publish something on the web. One of the design goals of this activity was to provide students with a simple way to publish web pages. However, the current implementation of the activity does not support the needs of an advanced user who may want to make changes to the format or style of the web page they want to produce.

**Discussion**

The data gathered from the study provided many valuable insights. It showed that much of the knowledge acquisition came not from the activity of comparing two species but rather from the process of selecting and choosing which species to compare. The exorbitant amount of time spent on planning by Mike and John, showed the power of constructivism. During that phase, Mike and John were able to accomplish the educational goals of the activity without following the activity's structure or without completing it. Karen on the other hand only looked at 6% of the resources and was still able to aggregate all of the factors in her post-activity response. The structure of the activity therefore allowed different types of students with different learning styles to accomplish the same learning goals. However, it is evident from the analysis above that time-based reminders are needed to keep the more curious and inquisitive students from straying away from the process at hand.

All the students found the steps provided in the activity valuable. The planning phase, did an especially good job at giving students exposure to the breadth of factors that are relevant to desert diversity. The organizational matrix on which each species was categorized seemed to work for all types of learners experienced in this study. It provided structure for those who needed it and permitted autonomous searching for those who did not prefer the structure. The steps, however, were process driven and not time sensitive, and therefore it failed to scaffold students’ time.
In regards to the interface, several insights were gained. By providing only a fixed form for students, the interface was not capable of meeting the demands of advanced users. The simplistic approach for providing just the basic functionality works for novice computer users, but power computer users will always demand their power tools. Since this activity is designed for a wide range of students, it will need to provide students with ways to personalize and configure the environment.

**Conclusion & Recommendations**

This formative evaluation has resulted in two design recommendations. The first recommendation is to integrate time scaffolding module that would prompt users at particular moments in the activity to remind them of the time that they have left. The second recommendation would be to add more flexibility to the page which students use to create their web pages. More flexibility would involve giving students more choice and options on how to format their web page.

Another study will need to be conducted to validate whether students benefit from reading other students’ web pages constructed using the activity. This was not tested because this evaluation only had three individuals. A larger study needs to be conducted in a classroom to test if the authoring and publishing on the WWW actually helps students understand desert diversity and environmental science issues from a global perspective.

Often teachers will have students work on activities in groups or pairs. To accommodate such situations, a study will need to be conducted to determine whether this activity provides the same learning experience when several students are engaged in creating a single web site. The study will need to determine whether the engagement and time on task scaffolding that is used in this activity hold true in a collaborative environment.
Bibliography


Follow the steps below. To start, click on Plan to see a list of possible plants and animals that you can choose from.

1. **Plan**
   Decide whether you are going to write about two animals or two plants, what deserts they are from, and what species you will use as an example.

2. **Decide**
   After reviewing the available resources and possibilities on two specific species, make a decision.

3. **Research**
   Gather in-depth data on the two species you have selected.

4. **Create**
   Write up your findings focusing on similarities and differences.
Appendix II – User: Karen

See: http://www.bhavin.org/sri/2557.htm
Appendix III – Create Form

For the next part:

1. Fill in the table below with the information you find from your research.
2. Pick a category that is the most interesting for your species. Fill in at least one similarity and one difference and your reasoning for it. Your similarity and difference do not need to be part of the same category.
3. Write a 4-5 sentence paragraph for each similarity and difference you choose.

<table>
<thead>
<tr>
<th>Gila Monster/Desert Iguana</th>
<th>Similarity (4-5 sentence paragraph)</th>
<th>Why this similarity is interesting? (4-5 sentence paragraph)</th>
<th>Difference (4-5 sentence paragraph)</th>
<th>Why this difference is interesting? (4-5 sentence paragraph)</th>
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<tbody>
<tr>
<td>Habitat Requirements</td>
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<td>Water relationships</td>
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<td>Other special/general adaptations</td>
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<tr>
<td>Food Web relationships (diet specialization)</td>
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<td>Human effect/endangered status</td>
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<td>Other</td>
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Please type in URLs of pictures of your species (right-click on a picture and type in the URL that is listed under Properties)