Using Technology in Science: Differentiating Instruction for 5th Grade Students

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Abstract

Differentiating instruction means creating multiple conduits so that students of different abilities, or learning needs, experience equally appropriate ways to grasp, use, develop and present concepts as a part of the daily learning process. The purpose of this action research was to investigate how technology could be used to differentiate instruction and improve student performance for 5th grade science students. Data was taken from an interactive PowerPoint, tests, student journals, and teacher observation. The sample consisted of 24 5th grade math/science students. Results from the pre-test/post test revealed students performed better after reviewing an integrated PowerPoint. The average score was 35% for test 1 and 78% on test 2. Four students' scores were eliminated because they either took only the pretest or posttest. Results indicate that technology improves students' motivation and performance.

Background

Differentiation, Individualized Education Program (I.E.P.), and inclusion, are examples of methodologies teachers use to deliver instruction to their students. These methods have become the education mantra in order to ensure every student reaches standards set forth by the government. With all of this pressure to help our students succeed, teachers must find exciting and creative ways to meet this challenge. The purpose of this study is to investigate how technology can be used to differentiate instruction and improve student learning.

No Child Left Behind (NCLB) has placed a great deal of pressure on principals and teachers to prepare students to learn material in order to pass mandatory tests. Principals are pressured to obtain high scores, and they in turn stress to their teachers the need to have all students. In many cases this has resulted in educators teaching to the test so they may ensure passing scores. This type of instruction leads to paper pencil activities that are not differentiated, but also do not improve critical thinking skills. Many students come to the classroom with poor
higher level thinking skills and the inability to solve problems. Students struggle with making connections between academics and real world situations. Students have become poorly motivated and with a considerable amount of learned helplessness especially in science. As the pressure each year to pass mandatory tests increases, I see more students losing their joy for learning. My goal is to see my students become better critical thinkers and problem solvers through the discovery and joy of learning in my science class. The research for this study occurred in my 5th grade science classroom.

Best practice suggests that students learn best when they are actively engaged. Contextual learning and hands-on activities are especially effective in the content areas of math, science, and social studies. I understood this my first year of teaching. Today it is all about passing the Texas Assessment of Knowledge and Skills (TAKS) tests. The problem is my students do not want to hear the word TAKS. Those that have not fallen victim to failing the TAKS at third grade, come to fifth grade still ready to learn, but they want to have fun also. They need instruction that is interesting and engaging. Students must be active participants in their education and not passive receptacles. This can be a difficult task when there is so much high tech entertainment available. Teachers have a difficult time competing for their students’ attention. Educators will spend endless hours planning invigorating lessons, but no two children learn identically. Children come to fifth grade with varying amounts of background knowledge; however, curriculum is written for the average student. Most classrooms range from below grade level to above grade level. Due to special education laws many resource students are mainstreamed into content areas such as math and science. These students must have their needs met as well. How is a teacher to provide for the varying needs of their students without having to prepare several different
lessons, while keeping them motivated and engaged? One answer may be to meet their needs through differentiated instruction.

Differentiating instruction means creating multiple conduits so that students of different abilities, interest or learning needs, experience equally appropriate ways to grasp, use, develop and present their acquired knowledge as a part of the daily learning process. Differentiated instruction is not preparing individualized lessons, but rather tailoring instruction to meet the students at their ability. For example, “a teacher who conjures up a metaphor matched to a student’s cognitive ability and personal interests is differentiating, as is a teacher who pushes the thinking of an advanced student during a whole group class discussion (Carolan & Guinn, 2007).” Differentiating is when a student can choose a book to read and show their learning through creating a travel brochure, newsletter or similar activity. This does not require the teacher to make different lessons, but rather accept a variety of student work. In other words, differentiation occurs during the course of everyday instruction.

Motivation is a direct result of how engaged the student attends to their task. Motivation is a result of purposeful engagement and being successful. Students who are bored because the work is too easy become unmotivated to learn. On the other hand, students become disconnected when the work is too hard therefore unmotivated to learn. How then can a teacher engage all students at all levels so that everyone is learning and everyone is motivated? One answer to this dilemma could be integrating technology into daily instruction. While there is no one simple answer to address all the educational needs of my students, technology is an essential tool. Through the method of acceleration/deceleration my students could listen and click through at their own pace guided PowerPoint lessons. Not only would this differentiate instruction but also individualize it to to meet their needs. While only one lesson is prepared for all students, the
amount of information available to them is unlimited. This meets the needs of the above average student as their instruction is enriched through additional information. In addition, it meets the needs of my resource students as difficult concepts are explained and the ability to hear and see the information repeatedly is at their fingertips. In my room, there are four computers. I use them regularly, but usually for fast finishers and special projects. I want to change this to include all students, specifically my resource students. It would be great for them to access lessons and then practice with guided examples. Students who are gifted or high achievers could access lessons that are more challenging. In typical classes, many of them have to wait for the rest of the class to catch up. I see them bored and disinterested. Therefore, the purpose of this action research is to answer the following research questions:

- How can technology be used to differentiate instruction for 5th grade science students?
- Can technology be used to simultaneously improve motivation and accelerate student achievement?

For the purpose of this research, technology is defined as the hardware present in my classroom and our school computer lab, including but not limited to internet access, software, digital cameras, printers, and scanners. It also includes software that will be used to determine the effectiveness of technology. Resource students are defined as those students who receive accommodations and modifications as indicated in their I.E.P.’s. Finally, this researcher hypothesized that technology used in this classroom will improve students’ performance and motivation.

**Literature Review**
A review of the literature indicates that there are benefits to integrating technology with daily pedagogy. Researchers suggest that in order for technology to be a successful tool in differentiating instruction certain methodologies should be followed (Anyanwu, 2003; Mojkowski, 2008; Savage, 1993). Technological activities should be inquiry based, and include modeling and graphing. Instruction should be goal oriented, hypothesis driven, cooperatively based grouping, and cross-curricular integrated (Savage, 1993; Mojkowski, 2008; Anyanwu, 2003; Beloshitskii, 2005). The key to technology integration is to understand that technology does not teach. Teachers teach.

While this may sound easy enough, there are barriers to differentiating instruction with or without technology. Jennifer Carolan and Abigail Guinn(2007), in their article, Differentiation: Lessons, state that teachers hesitate to weave differentiated practices into their classrooms because teachers believe they lack time. This is due to their misunderstanding of the definition of differentiated. A common misconception is that differentiated means to teach the same thing three different ways or prepare multiple lessons. What most teachers do not realize is that they differentiate instruction every day just by being a good teacher. For example, a teacher who personalizes instruction through scaffolding or presents information geared toward multiple learning styles is meeting the needs of her students (Cusumano & Mueller, 2007). A teacher who uses the question-answer-response method (QAR) and accepts the varying levels of responses from her students is differentiating. A teacher who plans a lesson using technology which allows students to perform at their ability is differentiating. Not one of these activities requires any more time than traditional planning. In actuality, it would save the teacher time and headaches, as less time would be spent on disciplining and re-teaching.
When bringing technology and curriculum together it is important to think strategically and systematically in order to avoid defragmentation of limited resources (Morjkowski, 2008). As teachers incorporate a variety of tech tools into their curriculum they should prioritize the learning objectives, link technology applications to instruction, address any problems that develop during the lesson, and reflect on the quality of learning that took place (Morjkowski, 2008). It is important to note that some students will be learning technology applications at the same time they are learning the core content being taught. For low performing students, this can be problematic and actually cause conceptual learning to be impeded because they are focused on how to navigate the software instead of learning the concepts being taught. To avoid this problem, unfamiliar applications should be taught to students before it is used to instruct academic subjects.

There are numerous ways to differentiate instruction within a classroom using technology. In one respect, technology can be used solely as a monitoring system to track student progress. Ysseldyke and Bolt (2007) conducted a study using the Accelerated Math program that tracked student performance. The study indicated that teachers who used the program with integrity had extremely significant high results. The study revealed that using a progress monitoring system to adjust objectives as they were mastered resulted in significant increase in scores. Similar results were shown in Freeman and Crawford’s (2008) study of a pilot math program called HELP. The HELP program was specifically designed for English Language Learners. This program is software driven and also tracks students’ scores. Both of these programs were field tested across several states and districts, and reflected improvements of more than 70 percent. These two studies suggest that technology is a significant tool for differentiated instruction.
Anyanwu (2003) indicates the importance of student feedback for technology to be effective. Technology must be accompanied with facilitation and monitoring in order for authentic learning to take place. When students are part of a supportive environment where feedback is available, technology is a valuable asset that improves student learning and motivation (Anyanwu, 2008). Anyanwu (2008) compared two groups of students in 1998 and 1999. The data was obtained by comparing the highest and lowest of twenty-seven students in a physical environment and twenty-three students in an online version of the same program. Data analysis indicated that the students in the physical environment were better grounded in literary discourse than the online students. However, a limitation of this study was the amount of prior knowledge the students in the online class possessed. Many of them had excellent technology literacy but limited understanding of literature elements. On the other hand, students in the physical environment lacked the technical language needed in a media environment, but had better literacy skills. This is contradictive to studies that showed technology improves student performance. This was interesting to observe as my students had limited knowledge of the programs we used.

Technology based lessons can be made to allow students to participate at their ability level. Teachers could construct lessons that develop critical thinking skills and problem solving ability. For example, teachers could use blogs to differentiate science instruction (Colombo & Colombo, 2007). Blogs can be used to post videos, audio, podcasts or texts on a particular topic. Students would be able to post their thoughts and discussions, replay the lesson as often as needed, and post the results of their investigations. In addition, software, such as iTunes™ would make it possible for students to access high-quality instruction from lessons after they leave class. Tapping into students’ favorite listening devices is an effective way to impart knowledge.
Handheld devices are becoming more popular for providing information. Amazon.com has recently rolled out their e-books handheld device called the Kindle 2. This device can hold thousand of books. It is wireless, and the user can input their notes. The books can either be read or be read for you (CNET.com, 2009). This device would be an excellent way to assist struggling readers. Another excellent way to differentiate instruction is through the use of web quests. Teachers create topics and provide web sites to be searched. As students construct learning they are able to apply it to the activities assigned. A PowerPoint that incorporates interactive videos could be used as a whole class lesson or in a lab for individual use.

Palak, Walls, and Wells (2006) examined twenty-seven web-based units constructed by twenty-seven pre-school through 12th grade public school teachers. Their study investigated the extent to which participating teachers integrated computer and internet technologies to foster learning. Palak et al. (2006) found that “instructional technologies were a powerful tool to achieve successful implementation of curriculum-based learning objectives to foster learning in regard to student engagement, collaboration, and active learning”(p.364). This finding suggests that instruction differentiated with technology should have a high success rate when correlated to student achievement and motivation.

The literature indicates that technology is an integral tool for differentiating instruction. It can be used for monitoring student progress, promoting collaborative learning, and improving student motivation. In addition, technology can be used to self-direct and self-regulate learning with lessons that are self-paced. Azevedo, Guthrie, and Seibert (2004) examined the role of self-regulated learning as it related to understanding the circulatory system. The study was broken down into four phases. Phase one was planning and goal setting, phase two included monitoring processes, phase three involved regulating tasks and contexts, phase four represented reactions
and reflections to the task and contexts. The participants were divided into two groups, high
jumpers (achievers) and low jumpers (achievers). High achievers were participants who made
significant gains using hypermedia to learn about the circulatory system, while low achievers,
made little to no significant gains. The activity was all self-directed and regulated. This
indicated that low jumpers struggled with effectively learning the material. They continued to
recycle their goals, and use ineffective learning strategies. This limitation confirms the findings
of previous researchers that teacher feedback, facilitation, and monitoring are necessary for
technology to be a successful tool in differentiating instruction. High achieving students are
likely to be successful regardless of the programs used.

Implications for this study revealed that technology improves active learner engagement,
but does not necessarily indicate a guarantee of success. Struggling students and low achieving
students need direction and instruction. Teachers need to be aware of this so as to not leave
students who are already struggling on their own. The data would indicate that students who are
already low are going to continue to struggle even with the use of technology and therefore,
instruction must be scaffolded and a gradual release model should be implemented. Technology
did improve struggling students’ motivation. Students, who would perhaps normally lose
interest, stay committed to the task. As these students develop confidence by acquiring the
necessary learning strategies they will slowly need less support.

Overall, technology is an important tool for differentiating instruction. It fosters learning
and improves students’ understanding of material presented. Technology encourages students to
be active learners and participants, which in turn increases student motivation. These aspects are
vital to promoting student success. The purpose of this study is to examine how technology can
be used as a tool to differentiate instruction. The literature indicates that technology is still an
untapped resource that should be utilized more in today’s classrooms. It is important to teach the
students as they are learning the material and software provide continuous support, and allow
students to represent their knowledge through inquiry based projects. It is this researcher’s belief
that technology will increase student achievement while improving student motivation. This
would be seen though time on task, test scores, student journaling, and student opinion.

Methodology

Sample

This action research project took place in a suburban elementary school located in a large
master planned community in southeastern part of Texas. The school’s walls are painted with
murals that reflect the love of learning. This school houses about 900 students. This is down
from the 1,100 that attended last year, due to a new school opening in another part of the
neighborhood. The school’s population is diverse and contains middle to upper middle class
residents. There are approximately 48% Caucasian, 28% African American, 14% Hispanic, 8%
Asian, and 2% other, with 10% on free/reduced lunch. Each grade level has about 125 students.

The sample for this study is a convenience sample from a science class of twenty-four
fifth grade students, containing a group of students from below average skills to above average
skills. Five of the twenty-four students are on an Individual Education Plans (IEP).

Materials

Instruments used for this study were four computers in the classroom, the school’s
computer lab, PowerPoint©, Microsoft Paint, Microsoft Photo Story 3, Internet Explorer, and
Microsoft Word. Students knew how to use all of these programs except for Photo Story 3. It
was necessary for the science teacher to spend two days teaching them how to use the software
in order to produce a quality product. Students also used digital cameras to photograph their
experiments and microphones to record their voices. Land and water science kits were provided
by the district and are part of the 5th grade science curriculum. Students were given a chart for note taking, and a rubric (grading purposes) for their PowerPoint and Photo Story 3 (Appendix, A, B, and C).

**Data Sources**

Qualitative data was collected from students’ journals, and teacher observation. Quantitative data was collected from pretest and posttest. These data sources were used to answers the following research questions:

- How can technology be used to differentiate instruction while improving student motivation for special education students?
- Can technology be used to simultaneously deepen student understanding and accelerate student achievement standards?

Students were given a pre-test and a posttest to determine the effectiveness of instruction when using an interactive PowerPoint to retain and learn information. Rubrics were used to grade projects to determine the quantity and quality of information which indicated their compression and level of engagement. Observations were used to determine level of student engagement while working on any aspect of their projects. Journals were used to qualitatively determine students’ interaction with the information and comprehension of material represented.

**Procedure**

The first step in this project was to introduced students to the topic “Biomes”. Students were asked to brainstorm with their group, “What is a biome?” The brainstorm activity equates to a What I know?, What I Want to Know?, and What I learned?, (KWL) activity. As students listed their responses in their investigations’ journal, the teacher walked around and observed
their behavior and listened to their conversation. After a few minutes, students shared their thoughts, and then watched a 25 minute video about several different biomes. Students compared their responses to those they watched in the video and added any additional ideas not already listed. Students then picked the biome in which they would become experts. The biome activity was divided into two parts—a read/note taking activity and a web quest activity. The reading/note taking activity was done first. Students were given chapters to read and take notes, which took three days to complete. The journals were scored on their responses to the questions given. For the technology activity, students were given a chart to fill in while they sifted through the website. After students collected their information they were taken to the computer lab to create a PowerPoint of their biome. When the PowerPoint was completed, groups presented their findings. While each group presented their specific biome, the remaining students filled in the rest of their chart. Students were then given a posttest.

The next technology activity was a teacher created PowerPoint about animal adaptations, which whole group watched. The PowerPoint was interactive. It showed short video clips to reinforce the topic, and students discussed questions and shared interesting facts with one another throughout the presentation. Students were required to take notes in their journal while viewing the interactive PowerPoint. There were several open ended questions throughout the PowerPoint students had to answer. The students took another posttest, to indicate degree of retention and additional learning.

The next unit of study was weather and climate. For this PowerPoint lesson students were first given a pretest before viewing the PowerPoint. After viewing the PowerPoint lesson, which spanned two days, students were given a posttest. The pretest and posttest were the exact same test.
The final unit of study was on the constructive and destructive forces that occur on land. This unit was project and inquiry based. Students were given kits containing soil, sand, clay, and gravel. Students were given different activities to perform in order to develop their understanding of constructive and destructive forces. Students were divided into groups of four. They were given a digital camera to record their observations. They were also required to record their observation of each experiment in their journal. For each experiment, students were assigned roles such as: observer/note taker, photographer, bucket holder, and water pourer. These roles rotated for each experiment. When the unit was complete students used their notes and pictures to create a Photo Story 3 of the scientific method. Resource students were divided amongst the general population.

**Data Analysis**

Data was entered into SPSS for analysis to obtain quantitative data. The standard deviation (SD), mean (M), were run to identify significant correlations. Qualitative data was taken from teacher observation, and journals, to see if they answered either or both research questions. A histogram has been included to give a visual for the pretest/posttest data.

**Results**

**Quantitative Data**

The researcher compiled journal grades on the three note taking tasks. The scores ranged from 75 to 98 (\(M = 89, SD = 6.9\)). The presentation scores ranged from 85 to 100 (\(M = 97, SD = 4.1\)). Students took a posttest right after the *Biome* presentations. The test scores ranged from 65 to 100 (\(M = 85, SD = 10.9\)). The second posttest scores ranged from 80 to 100 (\(M = 93.17\) and \(SD = 5.2\)). These results show an eight point increase from the first test, with more students scoring in the higher range. For the weather and climate lesson, students took a pretest and
posttest. The scores for the pretest ranged from 15 to 60 (M=32, SD = 14). The posttest scores ranged from 30 to 100 (M=78, SD=20). These results show a forty-six point increase. The pretest was taken right before the technology lesson and the posttest was taken two days later after the lesson in order to see if they retained the information. The following histograms depict the improvement between the pretest and posttest.

![Weather Pretest Histogram](image)

*Figure 1. Weather pretest.*
Results from the pretest/posttest data from the weather activity indicate that technology impacted the students’ ability to learn and retain information for this activity.

**Qualitative Data**

Teacher observation revealed that during the PowerPoint tasks all students were engaged as well as during the Photo Story 3 activity. Students were asking each other questions, discussing what they knew about biomes, and assigning tasks to each other to complete the project. One student came up to the teacher and said, “Did you know the desert gets extremely cold at night?” The student was very excited that she had learned that information for herself, rather than reading about it in a textbook. She was excited because she found the information and she was going to use it in her PowerPoint. As the students created their photo stories they used their notes they took during the experiments. Having to review their notes and draw conclusions reinforced the concepts taught. Students were predominately on task and paid attention throughout each presentation. During the self-paced presentation students were able to review
the information a second time. Free response answers indicated they liked being able to look at it again. The notes were well written and in their own words rather than in those of the textbook. Positive comments from the students regarding the presentations indicate that students enjoyed the interactive simulation at the end of the PowerPoint, which wrapped up the entire concept of adaptive behavior.

The students in this study are normally cooperative and hardworking. During the PowerPoint and Photo Story 3 activities students worked together to complete their task. They divided the worked to save time. The students maintained focus and took great pride in their work. High achieving students produced quality work regardless of the task. However, technology activities allowed for self-discovery and authentic learning, students were able to construct their own meaning which meant the information would be retained longer. Low achieving students performed better using technology than they did with textbook work and stayed on task longer. They were able to show what they learned instead of being tested on what they don’t. This was both a positive and a negative outcome. The teacher had to keep moving them along, as they wanted to repeat the computer tasks over and over. Perhaps, if they had been given more opportunity to work with the computer in previous grade levels, the novelty of using the computer would not distract them as much.

Journal observations revealed that students stayed on task and focused. This was indicated by the detailed notes they took, and the explanations that they wrote. In their journals students wrote questions they thought of while viewing the PowerPoint. In addition, they were able to answer questions correctly given in the PowerPoint.

Discussion and Limitations
This study revealed that technology is a vital aspect to differentiating instruction. Students with wide-ranging skills and strategies were successful with the implementation of multi-modal technology. Students were highly engaged and enjoyed the tasks they were conducting. As shown in observations, the reason why more students may have found the PowerPoint and Photo Story 3 more fun is that they were active participants instead of passive learners. In addition, we must consider the novelty of this program. Students were able to record their voice, and create music. This was new for them which added to their interest and motivation. As the literature indicated, it was important for the teacher to interact and be readily available for the students as they proceeded through each assigned task.

Higher achieving students needed less support, which allowed lower achieving students more access to the teacher (Anyangwu, 2008). Teachers cannot expect to turn on the computer and have it teach the students. While the computer is a vital tool for teachers in the classroom, teachers still need to provide instruction. This became evident during the self-paced PowerPoint when students needed to ask questions that clarified concepts addressed in the PowerPoint. Since it contained narrated text, video clips and questions to which students responded, without a teacher present, students would have been left on their own to interpret the ideas stated in the presentation. This may have resulted in misconstrued understanding and/or frustrated students. It is also important to mention that a few students preferred to read from a book and perform paper only activities. One student even indicated that she despised Power Points, but this same student also indicated that she disliked the textbooks provided. It is important to allow time for discussion and debriefing of the concepts shown in order to allow students to process the information (Anyangwu, 2003; Hickey, Christie, Horwitz, & Kindfield 2003).
Teachers need to help their students make explicit connections if they want their students to retain and understand difficult concepts. When students verbalize the concepts taught they have to process the information, they are no longer passive receptacles – rather active learners. Finally, it is important to give students a task with incentive to complete. When the students were given a rubric with an assigned task they were vested in their goal.

Limitations

Due to the time constraints, and for the ease of data collection, three types of software were used, Microsoft PowerPoint©, Internet Explorer and Microsoft Photo Story 3. In order to create a quality project it took the students three weeks of 30 minutes of class time three days a week to complete the project. Time limitations may prevent teachers from pursuing this activity to fruition. Data collection took place over an eight week time period. True results of the effects of technology may not become apparent for several more weeks. It was difficult to observe if students were more on task with computer assignments than textbooks because of the novelty of using computers for class work, especially when the students used Photo Story 3. With additional time, students could choose the medium that would best present their work. This is important as it would further differentiate the task given and allow students to chose mediums that they felt most comfortable. There would not be several of the same projects but rather a variety. Using technology as a tool for differentiating instruction allowed me the flexibility to work with students at various levels. It empowered students of all ability levels to feel accomplished in their chosen task, and to construct meaning that they could retain.

Future Research
Further study of other methods to incorporate technology needs to be researched. It would be interesting to see what mediums students would choose for a given project. Project based lessons should be developed, and then allow the students to choose the technology application that would best represent their work. Furthermore, future studies could be set up using an experimental design. Classes would be randomly assigned and have an even range of student ability. Computer tests would be given to the technology group while paper tests would be given to the non-technology group. Finally, a longitudinal study would show the effects of technology over a longer period of time. As the students continued to use the same program novelty would no longer be a confounding variable. As students become proficient in the use of a variety of applications, they can focus on the actual concepts being taught.

References


Appendix A Rubric for Biome PowerPoint

Name of Biome (title slide)   10 points  _____________
Description of climate/landscape  15 points _____________
Illustration of climate/landscape  15 points _____________
Illustration and labels for 5 animals  15 points _____________
Illustration and labels of 5 plants  15 points _____________
Region Biome covers    10 points _____________
Annual Precipitation & Temperature  10 points _____________
Name (credit slide)    5 points _____________
8-10 slides     5 points _____________

Comments:

_____________________________________________________________________

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Region Biome covers    10 points _____________
Annual Precipitation & Temperature  10 points _____________
Name (credit slide)    5 points _____________
8-10 slides     5 points _____________

Comments:
Appendix B Land and Water Photo Story 3 Project

Welcome Junior Scientist! You have been selected to make a mini movie. For this project your task is to explain how to conduct an experiment. Your group will be assigned one of six experiments to demonstrate. Your Photo Story 3 should show how to conduct each experiment step by step. Please refer to your steps to conducting an experiment chart in your investigations journal. You will need a picture for each step of the process. Your pictures may be drawn, photographed, or downloaded from the internet. Find a picture that works for your experiment choice! Record your voice to explain each step and your observations. Create music to add creativity and excitement. Every voice in the group should be used and everyone should have a task to complete. Good luck!

Experiment Choices: Circle your choice
Demonstrating the Water Cycle
Investigating Streams
Where does the water go? Erosion and Deposition
Looking at the parts of a stream? Pictures will have to be obtained for this investigation
Modeling Tributaries
Hills and Rocks: How Nature Changes the Direction and Flow of Water

Land and Water Photo Story 3 Project

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Where does the water go? Erosion and Deposition
Looking at the parts of a stream? Pictures will have to be obtained for this investigation
Modeling Tributaries
Hills and Rocks: How Nature Changes the Direction and Flow of Water
### Appendix C Biome Graphic Organizer

#### Exploring Biomes

Directions: Go to the Science Spot at [http://science-spot.net/](http://science-spot.net/) and click the Kid Zone graphic. Click "Biology" and then choose "The Natural World." Scroll down the page to find the links for biomes. Visit the sites listed to find information to complete the chart.

<table>
<thead>
<tr>
<th>Biome</th>
<th>Temperatures (highs/lows)</th>
<th>Precipitation (total, patterns)</th>
<th>Plants (3-5 examples)</th>
<th>Animals (3-5 examples)</th>
<th>Find three interesting facts about the biome. (Locations? Other names? Records?)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tundra</td>
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<td>Grassland</td>
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T. Trimpe 2002