Experiential Education What Does It Look And Feel Like?

Jill M. Collins
St. John Fisher College

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Experiential Education

What Does It Look And Feel Like?

Jill M. Collins
Masters Program in Mathematics, Science, and Technology Education
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Experiential Education

What Does It Look And Feel Like?

Advisor

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Faculty Reader

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Institutional Review Board Documentation
Introduction

I completed the student teaching requirement for my teacher certification in December of 1998. Soon after I completed the student teaching I was sitting in a graduate class discussing my need for a teaching position when a classmate suggested I apply for a job in an Alternative High School. I had not considered such a position but I took the information and called the school. I have been working as a science teacher at the Wayne-Finger Lakes BOCES Alternative High School since February 1, 1999. I had wonderful experiences at both of my student teaching placements in the Rochester City School district, but nothing could prepare me for my current position.

Our program serves approximately 50 students with five full time faculty members. I am the only science teacher and I teach Earth Science, Biology, and Environmental Science. Regardless of where I teach I want to be the best teacher possible but I believe that my current job challenges me in ways that a traditional setting might not. In my education classes and during my student teaching I was exposed to a variety of teaching theories, strategies and concepts. I have experimented with Gardner's theory of multiple intelligence's, inquiry, constructivism, cooperative groups, multi-media presentations, MST integration, rubrics, and alternative assessments. I have also learned and worked with the learning cycle and traditional lesson plans but I had not heard of experiential education until I started working at the Alternative High School.
There are many definitions for experiential education but to me it means learning by doing. With experiential education you use a real life problem or situation and you learn theories and concepts as well as skills by dealing with the situation. When students learn through experiential education their work reaches a larger audience and serves a greater purpose than simply meeting a teacher’s requirement. Unfortunately I have not had much experience with this type of education and I’m not sure how to implement it in my classes. Our school has been slowly working towards experiential education. Some of the activities or situations the students have participated in include bridge building and maintenance on the Ontario County Pathways, wooden/canvas canoe building, fish stocking with the Department of Environmental Conservation and overnight backpacking. I need to be more comfortable with experiential education so that I can confidently implement it and tie it in with New York State standards. Through this research I developed a better understanding of what experiential education is and what it look and feels like.

Background of the Study

Research Rationale

As a science teacher I am constantly challenged to find new ways to engage my students in learning. I have a special situation because of the student body that I work with but I believe my concerns and questions are universal. Currently I work in an Alternative High School program with at-risk students. I find that most of my students struggle in a traditional setting with rows of desks and pages of notes. I am looking for a way to teach
the New York State Regents requirements in science with a hands-on, realistic approach. Most people would consider science to be taught with a hands-on approach already but I believe it needs to be updated. The recipe labs that most courses rely on don’t transfer to the real world for today’s students. Kids want to know how the knowledge applies to everyday life and they want it to be interesting. Experiential education might be one way for me to interest my students in the science curriculum.

The need to find a way to interest students in science is becoming more important as New York State changes its Regents requirements. In the past, students had the option to take a Regents Competency Test in place of a Regents exam if they were not strong in the subject. This is no longer an option. All high school students must now pass at least one science Regents exam in order to receive a high school diploma. As an educator I must find a way to teach Regents content to all of my students.

Purpose Statement

The purpose of this research was threefold. First, through experience I constructed a personal understanding of experiential education. Second, on a daily basis I critiqued and reflected on my lessons to determine what was successful and why and what was not successful and why. Third, I determined whether experiential education is an effective and efficient method of teaching content to regents students.
Holt (1989) made it sound simple when he stated that children are really acting like scientists all the time: observing, wondering, theorizing, testing their theories, and changing them as needed. Adults can put meaning into the world of children by helping them explore the things that most interest them (Holt, 1989). Gardner (1991) reminds us that school only matters if it yields something that can be used after students leave school. Dougherty and Miller (1998) state that new science curriculum must address how students learn as well as what they learn. Bushweller (1997) suggests a method for accomplishing this through using expeditionary learning, a curriculum that challenges teachers to get kids out into their communities to investigate real-life issues or problems, and in the process, develop solid academic skills. The non-profit international consortium eXperientia defines experiential learning as being founded on the active doing rather than the passive being done to. By doing, people practice the very skills they are learning and are more likely to maintain their change. Horwood (1995) summarizes experiential learning as organizing students' education into purposeful expeditions of inquiry, discovery and action.

Dougherty and Miller believe that science curriculum should excite students, alleviate students' fear of science, and encourage a lifelong interest in scientific questions. Newman (1998) reports that firsthand experiences will bring new knowledge to children, while developing their observation skills. A field trip can reinforce prior knowledge, open up unique ways of thinking, and provide children with opportunities to discover
new worlds. Bushweller (1997) found that expeditionary learning deals with real-life issues that get kids charged and intellectually engaged.

When discussing current science classrooms Roth (1994) stated, unfortunately experimental tasks often embody a cookbook approach. Students follow recipes gathering and recording data without a clear sense for the purposes, procedures, and their interconnections. These tasks have low cognitive demands and provide a context that precludes reflective thought and concentration. Shodell (1995) supported this argument by reporting that students believe that science is about learning established facts rather than engaging in a questioning process. Lopez (1989) reflected on the need for students to understand and develop the interconnections and relationships. Children know that nearly anyone can learn the names of things; the impression made on them at this level is fleeting. What takes a lifetime to learn, they comprehend, is the existence and substance of myriad relationships: it is these relationships, not the things themselves, that ultimately hold the human imagination (Lopez, 1989).

In addition to helping students develop relationships and a deeper understanding of the curriculum, experiential education improves self-esteem, develops perseverance and self-discipline. Bushweller (1997) cited a 1996 study of expeditionary learning schools nationwide by the Academy for Educational Development in New York City. The independent evaluation found that students in expeditionary learning schools showed “significant increases” in standardized test scores in reading and math and seemed to enjoy school more than typical public school students do. As Cummings and Winston
(1998) stated, when it comes to educating young people, teachers should look for new and creative ways to get students to “think outside the box.” In an effort to create a challenging, personally relevant science classroom I am going to implement an experiential education based unit. While implementing the unit I will observe my students to identify what experiential education looks and feels like. In addition to feedback from the students, I will keep a personal journal of my experience with this unit.

Methodology

I implemented the Adopt-A-Stream program in one of my Environmental Science classes. The Adopt-A-Stream program is a product of Delta Laboratories Inc., a tax exempt, not for profit organization dedicated to improving the environment. The program has all of the information necessary to integrate a water quality study into a curriculum. As stated in the Adopt-A-Stream teacher’s manual, “this interdisciplinary program gives classroom learning a real-life application, enhances students’ problem-solving capabilities, and can provide community recognition of the students’ efforts.” The program begins with a description of how to get started and introduces the issue of water quality. The introduction is followed up with watershed concerns. The actual water quality tests are divided into four categories: physical, chemical, biological, and microbiological. The program ends with guidelines on what can be done with the data generated by the students.
My Environmental Science classes are usually attended by upper classmen but that is a
guideline not a rule. I selected this class because I do not have to worry about New York
State Regents requirements. The Adopt-A-Stream program allowed us to investigate the
health of Flint Creek, which is located behind our school. In addition to investigating the
actual creek, it opened up discussions about pollution and water resources. I selected this
unit because it addresses real life issues and it incorporates a lot of hands-on science. The
fact that the creek is on our campus makes it personal for the students. They already
work with and enjoy the creek so its' health is important to them.

I implemented the Adopt-A-Stream program with my fourth period Environmental
Science class at Wayne-Finger Lakes BOCES Alternative High School. The Alternative
High School that I teach at is located in Ontario County in Flint New York. Wayne-
Finger Lakes BOCES operates two separate Alternative High Schools, one in Williamson
New York and the one I work at in Flint. My school is located on the same campus as a
BOCES Technical Career Center. Flint is a rural area located between the cities of
Canandaigua and Geneva on Routes 5 and 20. The Flint Alternative High School has an
average enrollment of 50 students in grades nine through twelve. Our students are drawn
from ten surrounding school districts. The districts that we pull from are: East
Bloomfield Central School District, Canandaigua City School District, Gorham-
Middlesex Central School District (Marcus Whitman), Honeoye Central School District,
Manchester-Shortsville Central School District (Red Jacket), Penn Yan Central School
District, Phelps-Clifton Springs Central School District, Romulus Central School District,
Seneca Falls Central School District and Victor Central School District. Our students
range in age from fourteen to twenty-one. Most of our students come from lower income families.

The fourth period Environmental Science class that I selected started with ten students in it but only seven remained at the end of the two month project. The Alternative High School has a continuous enrollment and students can be withdrawn from the program at any time. The ten students that were originally enrolled consisted of four males and six females. All ten of the students are white. The remaining seven students consist of two males and five females. Students are usually registered in this class to fulfill a high school sequence requirement.

The curriculum that my students were expected to work on during this project included topics from Earth Science, Biology, and Environmental Science as well as basic communication skills. The objectives of the unit included generating original research, recognizing the local watershed and issues concerning it and establishing baseline information on Flint Creek for four different parameters. The baseline information is broken down into physical, chemical, biological and microbiological parameters. While establishing the physical parameters the students developed map-reading skills and they strengthened their understanding of the processes of erosion and deposition. A general overview of ecology and the relationships in aquatic ecosystems will be covered during the establishment of the biological and microbiological baseline information. As part of the ecological study, the students will also analyze the effects of pollution. Unfortunately, due to time restraints we did not get to this point in the program during the
two-month time period. Students are able to recognize the local watershed and the issues concerning it but we did not get past the physical parameters for the baseline information. The unit was taught during the months of February, March and the beginning of April. It was adjusted as we worked through it based on the weather, time restraints and student response. The program is outlined as a thirty-day project but in just over two months we were only able to cover three of the six objectives.

Our school has a traditional Monday through Friday schedule with thirty-five minute class periods. I see the fourth period Environmental Science class directly before the lunch period. The program was begun on February 7th and this research ended on April 6th. During that time we had one scheduled week off, a conference day and a few snow days. In addition to these interruptions my students are often absent or pulled from my class for other activities.

Data Sources
Throughout the entirety of this unit I kept a daily computer journal (see Appendix A). During class and while in the field I made notes and observations. I then used the notes to prompt my journal writing on the computer. In addition to noting my direct observations, I critiqued and reflected on my daily lessons and their successes. A third source of data was a culminating test composed of Regents questions (see Appendix B). I created the test from existing Earth Science and Biology Regents exams. Test questions were selected based on the objectives of the project. Dr. Lucia Guarino validated the test for face value. The test was given to all participating students at the end of the unit.
Because we had not completed the entire Adopt-A-Stream program as intended, some of the test questions assessed for information that we had not yet covered. I graded the test in two ways. First I graded the whole test then I modified the grade by voiding some questions. The original test was twenty-one questions long and the modified version was only thirteen questions long.

Analysis
At the completion of the unit I analyzed my computer journal. While reviewing my journal entries I composed a written understanding of experiential education. In addition to constructing my personal understanding of experiential education I analyzed my journal to evaluate the efficiency of this method for teaching content to Regents students. The results of the culminating test were considered when evaluating the usefulness for teaching content to Regents students. Also, I now know what worked and what didn’t from my daily lessons so that I may make changes for future use.

Results
As written in my purpose statement, I hoped to develop a better understanding of what experiential education is and how to implement it. An improved understanding was one goal of a threefold purpose. In addition to constructing a personal understanding of experiential education, my goal was to critique and reflect on my lessons to determine successes and areas for improvement, and to determine whether experiential education is an effective and efficient method of teaching content to Regents students.
Purpose #1 - Construct a Personal Understanding of Experiential Education

The first purpose of my action research was to construct a personal understanding of experiential education. There are many definitions for experiential education but without having practical experience with it I felt as though the definitions were vague and geared towards the business practitioners. At this point a lot of the written information on experiential education deals with programs such as Project Adventure and business groups who have experimented with it to improve teamwork. My simple definition for experiential education prior to my research was “learning by doing.” I find that this definition holds true but I can now expand on it.

In order to construct my personal understanding of experiential education I needed practical experience with it and the opportunity to reflect on that experience. My action research was designed to meet this requirement. By working with the Adopt-A-Stream program I could be confident that I had the necessary guidelines to implement a true experiential unit. Bushweller (1997) defines expeditionary learning as a curriculum that challenges teachers to get kids out into their communities to investigate real-life issues or problems, and in the process, develop solid academic skills. According to this definition, the Adopt-A-Stream program qualifies as experiential or expeditionary learning. After working with the Adopt-A-Stream program for just over two months, I am amazed at how much is incorporated into an experiential unit. Reading through my daily computer journal I was amazed at how many different experiences the class shared.
At this time my personal understanding of experiential education is a three part definition; 1.) It is an interdisciplinary curriculum 2.) It provides a personal experience that meets a sincere interest and has an identifiable benefit, value or purpose and 3.) It serves as a platform for developing solid academic skills for the participant. This working definition is drawn from my journal entries (see Appendix A) and my reflection of the experience.

An interdisciplinary curriculum.
As I continue to improve my understanding of the education field, I realize more and more how important it is to integrate the different disciplines into common units. My action research allowed new opportunities for me to experience this need for interdisciplinary curriculums. There were a number of journal entries from my research that demonstrated the student’s frustration when they were required to use communication or writing skills in science class. For obvious reasons the students compartmentalize the different disciplines and get irritated when they are asked to blend the different skills. They don’t understand why they need to use complete sentences in science; “this isn’t English class, why can’t I just write the answer” is a common statement in my room. I believe that interdisciplinary units will help the students to develop a real-world understanding of how to utilize skills and knowledge.

The Adopt-A-Steamp program forced the students to use many different communication skills. They needed to record accurate data, request information from professionals, compile information in a report format and make public presentations. One of my journal
entries stated that “one student was frustrated by the lack of information about Flint Creek on the Canandaigua web site so she wrote them a note to let them know.” If I had requested this as an assignment, chances are the students would have grumbled about it being an English assignment but Barb wrote the note out of necessity and didn’t think of it as using English in the science room. Another journal entry reflected on the fear students demonstrated when they needed to make phone calls to gather information. Again, they were improving communication skills and completing English assignments without realizing it. Not all of the journal entries were positive about written or communication tasks.

One student in particular made repeated remarks about paper assignments such as “this sucks” or “this is stupid.” Even though Julie made negative comments about the paper assignments from the workbook, she completed them. I explained the need for some basic understanding before we could begin our work on site and she was comfortable with that. This is the reason I believe “interdisciplinary” is a valuable part of the experiential education unit. These units are a nice mix of learning styles and experiences. Julie was willing to do small amounts of paper assignments realizing that they would tie in with hands on experiences.

Towards the end of my research I asked the students to do a written reflection for me and it was one of the most positive experiences of the entire project. There were no complaints about having to write in science class; in fact the students expressed a desire to reflect like this more often. At the end of the period when I walked over to tell the
students it was time to go in, Nick made a positive comment about the silence, the time and the space they were given to reflect. Back in the classroom Joan shared with me that “no one even talked, we just sat there.” The same students who often complain about having to use complete sentences were asking to be able to write reflections more often in science class.

Another aspect of the project that inspired me to include “interdisciplinary” in my working definition of experiential education was the constant use of math. Math is often used in science for formulas, equations, and measurement but occasionally students revolt and declare “this is math, why are we doing it in science class.” I made a journal entry that recorded a two-day struggle with some measurement conversions. At one point the students were very frustrated but they worked through it and I recorded that “Yesterday they wanted to go to the math teacher to find out how to do this work. It amazes me how compartmentalized they see the subjects we study in school. We found the conversion factors and completed the math without the help of the math teacher and I hope the students realized that they have the ability to do these things without pigeonholing stuff.”

Given enough opportunities to blend the disciplines I believe students would find it very easy to blur the lines between the subjects we study.

**Provides a personal experience that meets a sincere interest.**

The second part of my working definition of experiential education is that it provides a personal experience that meets a sincere interest and has an identifiable benefit, value or purpose for the participant. This part of my definition jumped right out at me when I
reviewed my daily computer journal entries. Right from the beginning of the project the students showed a personal interest and shared thoughts, emotions and experiences around the creek and related topics. On the first day of the project I did a basic introduction and right away I noted that “Everyone participated and they started talking about possible sampling sites. Many of the students are already familiar with the creek and know friends or family who have the creek running through their property. There seems to be a true interest in this project. Julie wants to make sure I schedule the field experiences on Tuesday and Thursday because she has half days the other days of the week. Macy shared that the creek runs through her mom’s back yard and we could sample there.” The second entry of my journal had similar comments such as “I was surprised by their desire to stop pollution. I don’t see them demonstrate a love or concern for the environment on a daily basis.” And “Lots of kids have stories to share about the creek. I didn’t realize how many students the small creek affected.”

My journal is peppered with my reflections about the students’ personal interest in the project and the value that they saw in the work they were doing. One of my entries stated that “The students take more interest in the maps when they can look for their own homes and areas they know.” A few days later I recorded the comment that “Barb was excited when she was able to locate her house.” The students took a personal interest in the project and found it beneficial because they were working in an area that they were familiar with and water quality is a real concern for them. One of my entries summarized a conversation we had about water pollution and drinking water. “Ed thinks it stinks that NYS allows people to pollute even if it is controlled. The students think it should be a no
tolerance, no pollution policy. Ed talked about a dump he knows near his home that seems to be 50 years old with all sorts of trash, large and small. Samantha also talked about a dumpsite near her trailer with old washing machines and such.” On the same day I also noted “Ed can’t drink the water at his house. He and his family have to go to the town hall with large jugs or containers to fill up with water. Martha can’t drink the water in her trailer either. She won’t even brush her teeth with it. They buy bottled water or go without.” It was reflections like these that jumped out at me when I was constructing my personal understanding of experiential education.

Serves as a platform for developing solid academic skills.

The academic portion of this project was the most frustrating because of time restraints, but the Adopt-A-Stream project continuously provided a platform for developing academic skills. As I have already stated, this project was the basis for many interdisciplinary assignments and tasks. Students improved their note taking skills and verbal communication skills, they used math for measurements and calculations of formulas, they gathered historical data about Flint Creek from various towns and resources and they reviewed Earth Science and Biology material in an informal manner.

One of my journal entries recorded a student’s academic success with map profiles, “Ed made the remark “that’s cool” when he realized what the profile showed and how it worked.” Most of the students have already passed Earth Science but they harbored misconceptions about watersheds when we began the project. “When we started the class all of the students were confused about what the yellow line showing the watershed was.
Most of them thought it was a trace of Flint Creek. I used a bowl analogy to help them understand that it was the watershed and was identified as the highest point of elevation."

A few days later my journal recorded another academic opportunity, “I explained Activity 2.4 and we talked about point and non-point source pollution. There is some confusion about point and non-point but I hope to be able to identify some actual site pollution and have them learn from real examples.”

This project provided the students with many opportunities to work with metric units of measure, an area that they continue to struggle with. In addition to measuring in metrics, they worked with conversions from English units to metric and vice versa. Time restraints limited the academic material we were able to cover during the two months, but this Flint Creek project will continue to provide a platform for developing solid academic skills.

Purpose #2 – Critique and Reflect on Lessons
The second purpose of my action research was to critique and reflect on my lessons to determine what was successful and why and what was not successful and why. Looking back through my daily computer journal, I found a number of entries that either directly or indirectly suggested changes to the lessons or how I presented them.

My very first journal entry stated “I felt as though I was unprepared to start the Adopt-A-Stream program today. I shared a general overview but I don’t have specific tasks to assign the students. I need to get more organized or I am concerned that I will lose their
interest.” This entry is not very detailed and might be misleading. It seems basic, as a teacher you need to be prepared. I had in fact read through the entire Adopt-A-Stream program and made notes about how I thought it would work but I still felt unprepared. Some of the anxiety might be due to my lack of experience but I believe some of it is due to the fact that I didn’t know the outcome of this project. Unlike the recipe labs that are often used in science classrooms, this project didn’t have a definite right answer to work towards. One of my most successful lessons turned out to be a day when I thought the lesson was dull. “Wow. Today went very well. I thought the lesson was going to be rather boring because it just involved identifying point and non-point sources of pollution and discussing the watershed and what affects it. Once we got reading the information in the activity the students had lots of questions and comments to make.” What made this lesson successful was that I was prepared and comfortable with a topic but allowed flexibility when the students had input.

Another of my entries stated “Sometimes I get so concerned about schedules and lesson plans that I forget to let students use inquiry and discovery.” This is something that I need to work on as a teacher. Realizing that learning occurs in all different formats and settings, I need to be flexible and responsive to the students. Experiential education is the perfect setting for a flexible format that allows for inquiry and discovery. As my comfort with this type of curriculum increases, I believe I will experience more successes.

One of the aspects of the project that was not successful at first was the general research that I asked the students to complete when we first stared the project. Unfortunately my
directions were too vague and the students quickly gave up when they ran into
difficulties. Without a specific task or goal they floundered and wasted time. They were
more successful when I was more specific about what they needed to do. A simple
change but one that I could still improve on.

One of my journal entries expressed my concern that the students wouldn’t want to work
in a structured environment. “I was concerned that after working independently for so
long they would resent doing structured work but they worked well.” After the
difficulties with the historical research I was concerned that the students would resent a
specific assignment but they were responsive to it. Perhaps they needed a quick and
direct assignment for an easy success to improve their moral. I found more success with
my students when I had specific tasks or assignments for them. I would like to continue
to challenge them to do more independent and active learning but I recognize their need
for structure and specific tasks.

Another problem with the general research was the lack of information for the students to
draw from. Many of my first journal entries made reference to the frustration the
students were having with the research assignment. They tried using the Internet, calling
local towns and asking friends and family but we never found much success. In the
future it might be better for us to visit town clerks or local historians. I have also heard
that other schools have studied Flint Creek, it would be interesting to share information
and see what they were able to gather.
Reading through my journal I also noticed the need to assign specific roles to students. When we went out to the creek no one took responsibility for the equipment we needed or for note taking and other tasks. Some days I would walk out to the creek empty handed to see if the students would take the initiative to gather the equipment. On more than one occasion someone had to go back to school to get things we needed. In the future I will create a system with the students that assigns daily or weekly responsibilities. Even as adults we assume someone else will get the tools or do the work so I can’t assume high school students will take the initiative to make sure everything is gathered and all the work is done.

As I stated earlier, the students have an aversion to written work. I often struggled with them about written assignments and the paper work that accompanies this project. Some days were very unsuccessful because the students didn’t want to take the time to document what they were doing and learning. One of my entries states, “The students like doing this work outside but I’m not sure they are seeing the connection to formulas and conclusive data.” I wonder if having them do more of the written work on site would be more successful. I experienced success when I asked the students to write reflections about this project while they were sitting out by the creek. Perhaps blurring the line between written class work and hands on site work will make the transition easier. I would also like to experiment with more frequent reviews of the data. Sometimes we worked for days gathering data without doing anything constructive with it. I believe more frequent and scheduled reviews of the data would force the students to recognize weaknesses in their records as well as reinforcing the purpose of what they are doing.
This struggle parallels the interdisciplinary issue that I have reflected one. It isn’t just an issue of using proper English in science class, some days they just didn’t want to write useful information and some days they didn’t want to write at all.

One of my major successes was towards the end of the project when the Environmental Science class sponsored a school-wide creek cleanup day. This was something the faculty had discussed but never followed through on. The students now had a personal interest in the creek and they wanted it clean! I didn’t do anything deliberate on any particular day that made this event successful but the timing was key. By the time we had this event the students in my Environmental Science class had a true and vested interest in the project and they took over as the motivation. I witnessed the power of a small group of students with a personal interest in a project. They organized the event, promoted it and gave 100 percent effort on the day of the event. Allowing them to be in charge was critical to the success of the day. They were empowered and they outperformed my expectations.

**Purpose #3 – Determine Whether Experiential Education is Effective and Efficient**

The third purpose of my action research was to determine whether experiential education is an effective and efficient method of teaching content to Regents students. This was not an easy thing to determine and it has lead me to a number of potential research questions for the future. After constructing my personal understanding and working definition of experiential education, I do believe it can be an effective and efficient method of teaching content to regents students. At this point in my research I can not support this belief with
results. On the contrary my action research shows that experiential education is not effective or efficient for teaching content to regents students.

At the end of the two-month period working with the Adopt-A-Stream program I administered the culminating test composed of Regents questions. The seven remaining students completed the test. The average grade on the whole test was 38. The average grade on the modified test with questions voided was a 45. Only one student passed the whole test and only two out of the seven passed the modified test. Based on these test results, experiential learning is not an effective way to teach Regents content. The assessment covered three areas: map reading, erosion and deposition, and ecology. The map reading content was covered as well as most of the erosion and deposition material but none of the ecology was covered during the two months. The modified assessment tested for understanding of map reading and erosion and deposition. The students scored higher on the modified test but the average was still below passing.

The results of my action research also show that experiential education is not an efficient way to teach content to Regents students. This project lasted for approximately two months but did not cover all of the established objectives. Continuing at the same rate it would take another three or four weeks to complete the Adopt-A-Stream program. Using the program as it is written you only cover three specific Regents content areas: map reading, erosion and deposition and ecology. These three topics would normally be covered in a classroom in approximately three weeks. There are many more areas
covered and many valuable lessons are learned but they are not part of the New York State Regents Assessment.

In addition to the fact that not many Regents content areas are covered by this program, it requires a substantial amount of preparation time by the instructor. If I were to use this program again I would make a number of changes that would require additional planning and organizing. Of the six original overall objectives, only three were met. I estimate that keeping at the same pace it would take three months to meet all of the objectives and complete the Adopt-A-Stream program.

Conclusions

When I began this action research my purpose was threefold. I accomplished all three goals but they have led me to additional questions and research ideas. I am much more comfortable with my personal understanding of experiential education and I now have a working definition. At this time I define experiential education as a curriculum that provides an interdisciplinary, personal experience that meets a sincere interest and has an identifiable benefit, value or purpose and is a platform for developing solid academic skills for the participant. This definition has three parts to it and each one is vital to the success of experiential learning.

Experiential education is a wonderful tool for interdisciplinary learning. The use of experiential education increases the opportunities for students to utilize their various skills and knowledge together to accomplish a common goal. Throughout my research I
found evidence that students are much more involved and invested in a unit when they have a personal experience and sincere interest in the project. Experiential education also serves as a platform for developing solid academic skills.

It is the last part of my working definition that generates some questions and potential research ideas. If experiential education is a platform for developing solid academic skills, what is necessary to make it an effective and efficient method of teaching content to Regents students? By incorporating some short lectures or review sessions would this type of curriculum be more effective at teaching Regents content? If a different experiential learning unit was selected would it have been a better platform for covering Regents content?

The second purpose of my action research was to critique and reflect on my lessons. Reviewing my computer journal I was able to identify a number of successful lessons or activities as well as some areas or suggestions for improvement. Some of the basic needs for success with the lessons include knowing the material to be covered but allowing for flexibility, assign specific tasks or goals to give the students structure, designate roles and responsibilities to students to improve efficiency and allow for the written work to be completed on site whenever possible.

The final purpose of my action research was to determine the effectiveness and efficiency of experiential education as a method of teaching content to Regents students. This is the section of my action research that generated the most recommendations for further
research. My results show that experiential education is not effective or efficient for teaching Regents content. Because of the setting that I teach in I propose that my student body generated different results than you would see in a traditional school setting. I would be interested in the results of a similar project in a traditional setting. Would experiential education be more effective at covering Regents material with students who were familiar with Regents standards and expectations? Would the program be more efficient in a school with better attendance and fewer interruptions? The Adopt-A-Stream program is just one unit that can be used for experiential education, would a different unit generate vastly different results? Would the incorporation of short lectures or review sessions lead to improved effectiveness? If this unit was taught jointly by interdisciplinary teachers would the effectiveness and efficiency improve? I believe that experiential education is a platform for developing solid academic skills but there are many questions remaining about its effectiveness and efficiency at teaching Regents content.

My action research has provided me with an invaluable tool. I now have a working definition and personal understanding of experiential education with room for growth. I was able to identify strengths and weaknesses in my lessons and the project as a whole and this information will make future use of this unit more successful. I have additional questions about the effectiveness and efficiency of experiential education for teaching regents content, but I recognize it as a platform for developing solid academic skills.
Bibliography


February 7, 2000

Today was the scheduled day to begin the Adopt-A-Stream (AAS) program. Before we began the AAS the students needed to complete the paperwork from the field experience to the zoo. We did not accomplish much with the AAS today but I did talk to them about the project. I explained that we would be working with Flint Creek and we started to read the student introduction in the AAS student workbook. Everyone participated and they started talking about possible sampling sites. Many of the students are already familiar with the creek and know friends or family who have the creek running through their property. There seems to be a true interest in this project. Julie wants to make sure I schedule the field experiences on Tuesday and Thursday because she has half days the other days of the week. Macy shared that the creek runs through her mom’s back yard and we could sample there.

Lesson Plan: I felt as though I was unprepared to start the AAS today. I shared a general overview but I don’t have specific tasks to assign the students. I need to get more organized or I am concerned that I will lose their interest.

February 8, 2000

I shared my notes with the students today and was able to get more specific with them. I am encouraged by their sincere interest in the project. Barb was talking about catching people or businesses that are polluting Flint Creek and said that she was worried that we
wouldn’t be able to catch anyone. Julie thought that would be good because if we didn’t catch anyone then that meant no one was polluting. Barb was thinking that we might find pollution but won’t be able to prove anyone in particular was responsible, “I would rather catch them than not.” I was surprised by their desire to stop pollution. I don’t see them demonstrate a love or concern for the environment on a daily basis. Julie “I am excited about this project.” Lots of the kids have stories to share about the creek. I didn’t realize how many students the small creek affected.

Lesson Plan: I felt more prepared today. I had notes to share with the students that outlined the information in the first chapter of my teacher guide. I was able to be more specific about what they need to do in this first week. I still wish I had distinct tasks for them but I’ll see how they do with general guidelines. Ed, Samantha and Julie looked at the map to find out which towns the creek passes through. We identified four: Gorham, Seneca, Potter, Phelps. They highlighted the creek on my room map. Samantha took the time to trace the creek to Canandaigua Outlet and the canal. We identified what appears to be the beginning and end of Flint Creek according to the room map. The students were talking about the areas they wanted to research. Tomorrow I will have them commit to an area. Most of the creek is in Ontario County so we will divide up by towns not counties. I would have liked to have a bunch of maps for the kids to start working with but I haven’t had the opportunity to get to a map store or AAA.

February 9, 2000
Today the kids got started on the actual research. I asked at the beginning of class if they understood what they had to do and no one spoke up about confusion. Julie nodded that they understood. Samantha, Julie and Karl got right on the computers as soon as kids selected what towns they would represent and research. Gorham – Karl, Seneca – Ed, Macy, Potter – Julie, Barb, Phelps – Samantha, Martha. Ed and I discovered in one of the local phone books that Flint Creek was shown going as far south as Italy so we added that as a fifth area to research. Nick and Jim were absent today so they will have to pick an area tomorrow. Mike is not participating in this project. I think he is going to drop out and get his GED. Julie tried calling the Yates County Chamber of Commerce but the woman could not provide any information and gave Julie the Canandaigua Chamber of Commerce number. Samantha located a map Internet site and printed out information on Flint Creek in Phelps. Barb was frustrated by the lack of information about Flint Creek on the Canandaigua web site so she wrote them a note to let them know!

Lesson Plan: I explained that the students would need to create portfolios for their respective towns. Some kids said that they were going to do some work at home. Karl will do work at home because he misses most of class for early dismissal. Martha left early today also. Mike still is not participating; I need to check on his status. The students are doing ok without detailed directions but I feel a need to be more organized. I got a DEC number off of the web for them to contact tomorrow. I need to get more maps. I typed up a vocabulary sheet for them but did not share it with them yet. I will show them the outline of this research assignment in the book tomorrow. I need to go through the book and decide what I will expect from them. Doug brought in his tape
recorder for me today I need to get batteries for it. I also need to write a permission slip and have Craig ok it. So far the project is going well. The kids seem truly interested in it and they are all participating.

February 10, 2000

The students continue to do research. Some of them just sit around and talk but others are very good about trying different resources. Julie is one of my stronger students and she is always willing to call people when I have suggestions. Nick was back today and he was able to select his area. Actually he is working on the only area that no one else had selected, Little Italy.

Lesson Plan: There was no change in the lesson. I continued to work individually with the students to help them gather information.

February 11, 2000

Most of the students were out today because of snow days. Only Martha came to class and she worked on the computer. Vocational visits went as scheduled.

February 14, 2000

Snow day.

February 15, 2000
I had some luck finding phone numbers for the small town offices so most of the students tried calling the town clerks or courthouses to get some information. Nick made some phone calls but didn’t have any luck. He left messages with my name and number. The students are getting frustrated with the people because they don’t have any information. They continue to try and they have done very well with their phone manners. They need assistance with gathering their thoughts before they make phone calls. Often I will have them write down a list of questions before they call. They hold on to the papers like they are lifelines. I forget that they are still young and intimidated by adults when they have to be respectful.

Lesson Plan: Instead of using the computers I encouraged the students to make phone calls to gather information. Still no luck. This section is taking longer than I had anticipated. There is a lack of information. Very limiting. I believe I will change the focus of our efforts.

February 16, 2000

The same students that made phone calls yesterday (Barb, Julie, Samantha, Nick) tried again today. They called the same numbers and tried new ones. It is frustrating having only one phone and they need supervision to be in the kitchen on the phone so I feel like I need to be in two places at once. The students are losing momentum. They get easily frustrated when they don’t get immediate results.

Lesson Plan: No change. Continue to gather information from the community.
February 17, 2000

Today we sat together and looked at the AAS workbook to refocus everyone’s efforts. The research dragged on too long and they lost sight of our goals. They are still eager to do hands on and find it difficult to recognize a need for the basic information. I borrowed DJ’s topographic maps of the area. His students had already outlined the Flint Creek watershed so we were able to look at it and discuss how it was identified. I would love to have individual maps for each student but that is not practical. I need to get new topographic maps and get the areas for the southern tip of the watershed. I reminded the students to put all of their information in manila folders to use as portfolios. I explained the importance of their notes from the phone calls, whether successful or not. I want to be able to document their efforts.

Lesson Plan: Refocus the group by reviewing the AAS workbook activity 2.1. We read through the expectations to remind the students of the type of information they were looking for. Get maps from DJ’s room and familiarize the students with topographic maps. Hand out folders for portfolio use.

February 18, 2000

Snow day.

February 28, 2000
Everyone had lots of energy today. Attendance was high because everyone was bored after the long break. Today we started activity 2.2 and the students had a good response to it. I was concerned that after working independently for so long they would resent doing structured work but they worked well. Julie had to leave early because of her new half days MWF but she was concerned about falling behind. It is nice to see students concerned about their academics; sometimes I wonder if they care at all. This activity required the students to work with topographic maps and we used the Rushville, Stanley, Clifton Springs and Phelps quadrangles. The students take more interest in the maps when they can look for their own homes and areas they know. It took them a few minutes to settle into the work but they were looking at the map and they were learning indirectly so I let them just explore it for a while. Sometimes I get so concerned about schedules and lesson plans that I forget to let the students use inquiry and discovery. After they had their fill of open investigation they worked well as a team to answer the questions. We got through half of the activity so we will continue it tomorrow. The students had renewed interest in the project today. I was happy to see their willingness to participate.

Lesson Plan: Introduce topographic maps and activity 2.2. Talk about map scales, contour intervals, symbols and land use. Assist the students with their map reading skills.

February 29, 2000

Only five students were in class today Nick, Martha and Jim were absent and Samantha was with the counselor. The five that were in class worked well and finished activity 2.2.
There was some confusion with the profiles but no one got frustrated and I was able to work with them on an individual basis because the numbers were low. Ed made the remark “that’s cool” when he realized what the profile showed and how it worked. There is still some confusion with some of the students about how the profiling worked so I might expand by having them build a cardboard hill. Barb was excited when she was able to locate her house. That’s pretty neat. Julie has some good answers for the discussion questions. I am always amazed at what they are willing to talk about. They never cease to amaze me.

Lesson Plan: Finish up activity 2.2. Do a group lesson of profiling. Review contour lines and how to work with them.

March 1, 2000

Wow. Today went very well. I thought the lesson was going to be rather boring because it just involved identifying point and nonpoint sources of pollution and discussing the watershed and what affects it. Once we got reading the information in the activity the students had lots of questions and comments to make. Ed thinks it stinks that NYS allows people to pollute even if it is controlled. The students think it should be a no tolerance, no pollution policy. Ed talked about a dump he knows near his home that seems to be 50 years old with all sorts of trash, large and small. Samantha also talked about a dumpsite near her trailer with old washing machines and such. The students don’t like these but I don’t think they recognize how much human behavior has to change to do away with them, now and in the future. Ed wanted to know what needed to occur
for something to decompose. He recognizes that burying our garbage doesn’t solve the problem. Ed can’t drink the water at his house. He and his family have to go to the town hall with large jugs/containers to fill up with water. Martha can’t drink the water in her trailer either. She won’t even brush her teeth with it. They buy bottled water or go without. We talked about the taste of well water versus city water and peoples preferences. Julie loves city water. We also discussed the value of natural filtration versus chemical processes. The students talked about how long it takes for a cigarette butt to disintegrate and the smell from landfills. Martha’s aunt and uncle burn their garbage. There was a brief talk about recycling. The students also brought up Canandaigua Lake and how it has gotten better. That led us to a talk about Zebra Mussels and Canadice Lake. When we started the class all of the students were confused about what the yellow line showing the watershed was. Most of them thought it was a trace of Flint Creek. I used a bowl analogy to help them understand that it was the watershed and was identified as the highest point of elevation. All in all it was a productive class.

Lesson Plan: Activity 2.3. Use the four quadrangles from DJ. Talk about the watershed and point and nonpoint sources of pollution.

March 2, 2000

Today went well but was not as energized as yesterday. We started the period by reviewing some of the discussion from yesterday. I wanted the students to realize that I really listen to what they say so I shared some of their comments from the day before. After recapping our conversation, I asked a few of the students to explain to me what the
yellow line on the map represented (outlines the watershed) and what a watershed was.
The students then worked on completing Activity 2.3.

Lesson Plan: Review discussion from yesterday. Clarify meaning of watershed.
Complete Activity 2.3.

March 3, 2000

As soon as I started today I had some negative comments from Julie. When she saw that
I had another paper assignment for them she reacted by saying “this sucks or this is
stupid.” She finds paperwork “boring” no matter what the topic or how little the actual
written work. I explained that some paperwork and basic understanding is necessary in
order to make the actual experience outside valuable. I can’t teach everything on site.
They need to have some prior knowledge and experience before we go out to the creek. I
want the students to be able to problem solve on their own when we get out on site so I
must give them some basic knowledge prior to the site visit. Julie was ok with my
explanation but is anxious to build our monitoring devices and get out to the creek. I
explained Activity 2.4 and we talked about point and non-point source pollution. There is
some confusion about point and non-point but I hope to be able to identify some actual
site pollution and have them learn from real examples.

Lesson Plan: Explain and complete Activity 2.4 (there is a typo on the actual worksheet,
it says it is 2.3)
March 6, 2000

Because of Julie's comments and the lack of enthusiasm from the kids I spent a lot of time this weekend reading through the Adopt-A-Stream book to see how much more bookwork would be necessary. If I adjust things to fit our needs we can begin to do a lot more of the work on site. It is convenient for us because the creek is so close. I explained to the students that we are getting much closer to actual site work and that put a spark back in their eyes. They love being outside. Maybe I can teach this stuff on site?

Today the students continued working on Activity 2.4. This one is more abstract and more difficult for the students to grasp. They spent a lot of time talking and not much time actually working. Joan has joined our class and she plugs along no matter what chaos is going on around her!

Lesson Plan: Explain that we will be going on site soon. Ask the students to bring in old sneakers or boots (preferably), extra socks and old pants that they don't mind getting dirty. I also explained that I will be buying waders but if they have access to some that would be helpful. Finish Activity 2.4.

March 7, 2000

Today I pushed the students to finish Activity 2.4 so that we could go outside the second half of the period. It's amazing what a little outdoor sunshine can do to a person. The students moved quickly to finish up their work and we headed out to the creek.

Unfortunately, Julie was the only one that remembered old boots and jeans. The rest of them knew that they had been told to bring old stuff so I didn't hear any objections to our
trip outside. The students were careful to keep as clean as possible and they cleaned their sneakers when we got back. On the way out to the creek the students noticed the litter and vocalized that we should clean up the area. I agreed and we talked about doing a garbage hunt day and a clean the creek day. The kids thought they both sounded like good ideas. When we got down to the creek I asked them questions about the meander in the creek and we talked about oxbow lakes. We also talked about measuring the width of the creek. We just spent some time looking at the creek and talking about how and where we would test. We have a lot of work to do on site. I hope the weather stays nice. It was in the low 60s today and is supposed to be in the high 60s tomorrow.

Lesson Plan: Finish Activity 2.4. Get everyone caught up. Go on site and discuss logistics.

March 8, 2000

He he. Today we tried out the new waders that I bought at Wal-Mart yesterday. The kids were pumped to be going out and using new toys. Julie only stayed for about 15 minutes because it was one of her half days and she was bummed that she was going to miss our trip out to the creek. Nick and Barb wore the waders. They looked great. The students kept the waders on for the morning meeting. They kept saying they looked like dorks but they loved it. Our plan was to measure the width of the creek. Before heading out to the creek I asked the students how they were going to measure it when we didn't have a tape measure that was long enough. Julie suggested using a string and meter stick. We used the yarn and a meter stick. Only three students went out to the creek, Nick, Joan, and
Barb. It was a great day to be outside and the students worked very well. While we were down by the creek Barb made the statement “I love school”. That felt great!! Even though Nick got his pants wet he finished the job and measured the width of the creek. While Nick was in the water he looked up on the ridge and saw a male walking. He stated “there’s a man walking up there.” The “man” turned out to be Scott, a former student. Scott joined us down at the creek and was talking about how much he missed school and was mad that there was a week off. He was laughing saying he can’t believe he is saying these things. While we were out at the stream Joan made a sketch of the area we were measuring. She is going to be our note taker/journalist. Nick took some pictures but ran out of film after only one picture.

Lesson Plan: Measure the width of the creek on site. Start documenting the appearance of the creek.

March 9, 2000
Personal Day.

March 10, 2000
Personal Day.

March 13, 2000
Unfortunately the sub was unable to get the students to complete the assignments while I was gone so I had to regroup and get everyone caught up. The students used today to complete two Current Science reflections I had assigned to them on Thursday and Friday.

March 14, 2000

Today we had a productive class. I talked about some of the things that we need to accomplish in the next 2 ½ weeks and we recapped what we had done last week. I reminded the students to bring in old boots and warm clothes because we will be going out to the creek regardless of the weather. They all seem fine with going out in the cold. Anything is better than staying in the class!! Once we had reviewed our status I taught the students how to calculate stream velocity and stream flow volume. These formulas and directions are in the workbook but I found them to be unorganized and confusing. I hoped to make things easier by giving condensed notes. We also discussed the need to keep very accurate notes and to get average readings for all of the data not just one reading to represent the entire creek. The class discussed and decided to take turns being the note taker when out on sight. Joan offered to let us use her Ecology notebook. She has already started our class notes in it from last Wednesday. We decided to use her notebook and just take turns writing in it. I wrote the formulas on the board and we talked about breaking into teams and collecting the data in an efficient manner. The students are excited about getting on site. They all want to get in the water.

March 15, 2000
Today we went out to the creek to prepare to measure the Stream Velocity. The students had to make sure to bring all of the necessary equipment. In addition they needed to decide who was going to take the notes for the day. There was some confusion at first about what we were doing but once everyone listened they understood the task. A couple of students actually brought old clothes and changed to go outside. Even though they look funny the students are all willing to wear the waders. When we got down to the creek they did a good job of working as a team and getting the work done. They were frustrated by the lack of time and requested that we work through lunch tomorrow. They planned to bring their lunches and take turns getting the work done. Great idea!! We only managed to get one set of 10 meters marked off but we should get much more done tomorrow.

March 16, 2000

Today in class I only had a handful of students so instead of going out to the creek we discussed what we would be doing for the next two weeks. The students have a difficult time seeing into the future and deciphering what they need to do from the written directions in the workbook. We talked about the fact that we are going to be selective about what we do from the book. Because of the weather and the fact that it is early spring we won't be doing very much activity at this time with the biological section. I believe it is too early for us to find much diversity in the animals. The students understood that that would give us distorted results. As much as I want the students to take the lead and plan our next two weeks they are not doing so. They would prefer that I
just tell them to do when they get to class each day. The do whatever is asked of them but they don’t like having to do the planning and using forethought.

March 17, 2000
Conference Day

March 20, 2000
Today we actually started to get some velocity calculations. Things didn’t go so well. Ed was in the waders and Joan was in charge of the bobber and the timer. I helped the students by watching the bobber going past point B and telling Joan to stop the timer.

We had all of our equipment and it seemed like we would get lots done even though we did not have many students. On our second attempt the bobber floated out too far in the creek and Ed couldn’t reach it. The bobber floated right past him and down the creek.

We followed the bobber but it was on the far side of the water and the level is over the waders. Ed was willing to cross the creek at the bridge and walk the shore to grab the bobber that had gotten hung up in some downed branches but we did not have that much time. Instead Ed was thoughtful enough to mark the spot on our shore directly across from the bobber so that if someone else had a chance to walk the other side they would know where the bobber was. If you were standing on the shore above the bobber you would not be able to see it because it was under an overhang. I had not even thought of marking the spot so I was glad when Ed thought of it. Unfortunately chasing the bobber took up most of the period and we didn’t get any calculations.
March 21, 2000

By now we didn’t think the bobber would still be in the same spot so instead of wasting lots of time looking for it we grabbed another one and set out to determine our velocity. The students did a great job with this task. They worked together and got a variety of measurements. The students like doing this work outside but I’m not sure they are seeing the connection to formulas and conclusive data. I need to make sure I spend some time reviewing our goals with them. I still do not see enough initiative on their part. They are great about participating, but they are very passive about organization and planning. I need to remind them on a daily basis what we need to take outside with us and what our goal for the day is. I would like to see them more aware of the long-term goals. I’m not sure if I should lead more or less? I will have to do some experimenting with this.

March 22, 2000

Ed was the only student in class today because the rest of them were absent or at the Geva theatre.

March 23, 2000

Back on track today. Ed and Julie worked together to measure depth across the creek. Their first attempt did not go so well. Julie was getting very frustrated with Ed and then she almost fell a few times and wanted to quite. Ed didn’t understand what they were doing and Julie is not very patient but they managed. Julie suggested they change rolls and that made things better. After Julie almost fell she wanted to quite but I pointed out a section of the creek that was not as deep. They were able to get measurements all the
way across on their second try. The other students were good about writing down the data and observing. They have been very good about not wandering off and no one has been caught smoking. That is huge for this group. Even when there isn’t work for all of them to do they stay close and are willing to help as soon as someone needs something.

March 24, 2000

Today was absolutely gorgeous out and I wanted to break things up a little. Instead of working on gathering data, today I asked the students to write a reflection for me. I explained that they could write about how they felt about the project or they could list questions and/or observations or they could share their feelings about the space we are working in out there. Wow, it was incredible. I only had three students outside with me because the rest of them left early or were absent but the three that went out were great. Ed, Nick and Joan were the students. We all walked out together and I reminded them of what they needed to do and I explained boundaries so no one went too far. I walked down by the water because I enjoy the sound. I told the students they could sit if they could find a dry spot or they could walk around, whatever as long as they wrote. The three of them ended up together on a log down near the water. I didn’t watch them very much because I wanted them to feel like they had privacy and I trusted them. The few times I looked over they were all sitting there quietly. Once I looked over and they all had their heads down and were writing. When I walked over to tell them it was time to go back in they were bummed. Nick made the comment that it was great to do this and he didn’t want to go in. They all agreed. I said something about the weather being so nice and I hated to go in too but Nick corrected me and said it was the silence the time and space he
was given to reflect. It helped that it was nice out but it was the experience that they cherished. We also talked about the creek clean-up day scheduled for next Friday and they are very excited. They suggested three different teams or squads: D.J. with some kids in canoes, a group with waders and a group on foot doing the land and surrounding areas. I love that they care so much and are thinking ahead. When we got back in the room I was alone with Joan for a few minutes and she shared with me that the reflection time was awesome, “no one even talked, we just sat there.” It’s rather powerful when you can get three teens to sit side by side without supervision and they discipline themselves to respect the time and space! Today was very encouraging. I will have to do more assignments like this. The writing can have many benefits.

March 27, 2000

Today was a day for us to regroup and make sure we stay on task. We reviewed the data that we have collected and we compared it to what we need. We have most of the numbers that we need to plug into the velocity and flow volume formulas but we need to get more width and depth measurements. We planned on going out tomorrow to get that data. Once we were done talking about the need to organize our data the students took some time to read through the workbook and plan out the next few days. Some of the students also took the time to review the data we have collected so far. They realized they need to be better about using dates and being very descriptive. The students also made some positive comments about the reflection time on Friday. Nick and Ed wanted to know why I allowed them to write about their feelings as opposed to science information. We had a very nice conversation about the fact that their feelings toward the
creek will affect their effort and commitment. I shared with them that if they feel a responsibility towards the space they are working in then they will put more effort and emotion into the work. They agreed and felt good about their participation. “We should do that more.” I commented that I would need to remember to have them reflect again later in the project. Today we also talked about the Friday creek clean up that is planned. I told the students that I expect them to be leaders out on site on that day. They are very excited and look forward to the task. We also talked about using data from the location behind school instead of gathering it from many sites. The project is running long so we will become experts on our little stretch of the creek and work from there. The students remain positive and cooperative.

March 28, 2000

Today four students went outside to gather width measurements from the creek. Barb and I wore the waders and Ed, Samantha and Nick worked from shore. Before we went out Nick made the comment that he has not missed a day out at the creek yet and he doesn’t want to because it is fun and he likes working out there. It is so encouraging that the kids are still willing to throw the funny waders on and get to work. We had a good time outside and were successful in gathering width measurements. The students usually attend out morning meetings in the waders, which seems to be a way for them to share with the rest of the school what they are doing. They are proud of their efforts and it is a chance for them to say “look what I’m doing in class.” They were better about grabbing the equipment today but they still need some coaxing and prodding. I need to get them
more involved in the daily decisions. I want this to be their project not mine. I want them to be experts on Flint Creek.

March 29, 2000

March 30, 2000

Today’s class was cut short because I was cleaning up after the cow uterus biology lab. The students were great about working around my other commitments. We are planning a school-wide creek cleanup day this Friday afternoon. I asked the students to begin organizing for the afternoon activities. Ed and Julie were great about typing up a voting ballot for Friday’s prizes. They came up with some great categories: biggest haul, prettiest piece, most toxic, most bizarre, art piece, most garbage, most recyclable, most valuable, and oldest piece. We also discussed the need for them to stay on task and motivate the other students. All of the students are very excited about the upcoming event. They can’t wait to get the area cleaned up. They have really taken a personal approach on this project.

March 31, 2000

Today is the big day. The kids all came to class on time and they were excited about getting ready for the day. As a group we had to form teams with leaders and decide how we were going to organize the afternoon. The students decided on four teams: garbage gophers, waders, East Side creek cleanup and west side creek cleanup. They each selected a group to lead and Ed volunteered to present the groups during our morning
meeting. In addition to creating the groups the students gathered the supplies that we would need – waders, plastic bags, masking tape, markers, the ballots, shovels and hoes, and garbage bags. They all agreed to meet back in the science room right after lunch to prepare for the working afternoon. I am so excited by their enthusiasm. They are all taking this very seriously. Ed did a fabulous job presenting during the morning meeting. He created a sign up sheet and fielded questions from the other students. I again reminded the students that I was counting on them to lead and motivate the other students while we were out at the creek.

The afternoon of creek cleanup was amazing. I was/am so proud of the students, they all worked very hard and took the work seriously. We gathered two truck loads of garbage and there is more to get. They had a very good time and accomplished a lot. A great afternoon.

April 3, 2000
Riding on the high from last Friday I asked the students to write a reflection about our experience. The students were very excited and kept asking when we were going to do it again. I am so glad that we had this activity, it was a great way to tie our work together and share with the rest of the school.

April 4, 2000
I would love to take the students back out to the creek and continue our research but they are not doing a good job with the notes and information gathering so we must regroup.
The students do a great job out on site but they don't do a good job with the records and summarization of the information. They have neglected to include the date on their records and they jump around in the notebook and aren't organized. We definitely need to work on organization skills. We reviewed the formulas and our data and prepared to organize and summarize. We again talked about the Friday activity and the students voted on the garbage prizes. We also viewed the videotape of the creek cleanup. The tape came out very well. It has some great images and shows how hard the students worked.

April 5, 2000

Today the students split up into two groups and worked on organizing the data to fill in the formulas. Julie informed me that "this is really boring." We discussed the need to make sense out of our data. It is amazing how short their attention spans are. It is also interesting to note that they don't need to understand what they are doing or why as long as they are doing. If I wanted to keep taking them out to the creek every day and just kept giving them tasks to accomplish they wouldn't have a problem with it. They have a very strong aversion to written work and organized material though. I am considering longer segments of time at the creek and doing the written work on site so they don't associate it with "school work." I have some great ideas for changing this project next time. With the block schedule that we have proposed for next year this project will go quicker and smoother.

April 6, 2000
There were only four students in class today but they worked on finishing the Stream Flow Volume formula. It was great to see them using math. They had to convert feet to meters and get averages. Yesterday they wanted to go to the math teacher to find out how to do this work. It amazes me how compartmentalized they see the subjects we study in school. We found the conversion factors and completed the math without the help of the math teacher and I hope the students realized that they have the ability to do these things without pigeonholing stuff. Math is used in science and English is everywhere. They still complain when I remind them to write in complete sentences. Over the past couple of days the students have been forced to recognize how unsatisfactory their notes and information gathering was/is. I hope to see an improvement when we go back out. We have plenty more work to do.
Appendix B

Base your answers to questions 1 through 3 on the contour map below. Elevations are expressed in feet. The ▲ indicates the exact elevation of the top of Basket Dome.

1. What is the highest possible elevation of point Y on North Dome?
   (1) 7,500 ft  
   (2) 7,590 ft  
   (3) 7,599 ft  
   (4) 7,601 ft

2. Forty years ago, the highest elevation of Basket Dome was 7,600 feet. What is the rate of crustal uplift for Basket Dome?
   (1) 0.05 ft/yr  
   (2) 2 ft/yr  
   (3) 0.5 ft/yr  
   (4) 20 ft/yr

3. In which general direction does Tenaya Stream flow?
   (1) southeast to northwest  
   (2) northwest to southeast  
   (3) southwest to northeast  
   (4) northeast to southwest

The Generalized Bedrock Geology Map of New York State provides evidence that water flows from Lake Erie into Lake Ontario by showing that Lake Ontario:

   1. is north of Lake Erie  
   2. is deeper than Lake Erie  
   3. has a larger surface area than Lake Erie  
   4. has a lower surface elevation than Lake Erie

Which New York State landscape region is located at 42° N 75° W?

   1. Erie-Ontario Lowlands  
   2. the Catskills  
   3. Hudson-Mohawk Lowlands  
   4. Tug Hill Plateau
Which ecological principle is best illustrated by the diagram below?

1. In an ecosystem, material is cycled among the organisms and their environment.
2. In an ecosystem the number of producers and consumers is equal.
3. Competition within a species results in natural selection.
4. An ecosystem requires a constant source of energy.

A desired outcome derived from an understanding of the principles of ecology would be

1. the elimination of most predatory species.
2. an increase in world human population.
3. a decrease in disruptions of existing wildlife habitats.
4. an increase in the amount of industrialization.

Which factor promotes competition between organisms in an ecosystem?

1. cycling of minerals
2. decomposition of organic matter
3. limited resources
4. presence of saprophytes

In a natural community, all the living things that directly or indirectly affect the environment are known as

1. pioneer organisms
2. secondary consumers
3. climatic limitations
4. biotic factors
The diagram below is a three-dimensional model of a landscape region.

Which map view best represents the topography of this region?
Information relating to an ecosystem is contained in the diagram shown below.

Which information belongs in areas X and Y?

1. X — biotic factors; Y — abiotic factors
2. X — ecological relationships; Y — biotic relationships
3. X — abiotic factors; Y — interacting populations
4. X — energy flow; Y — biotic factors

The diagram below shows organisms in and around a pond.

Which ecological term refers to all the organisms shown in the diagram?

1. heterotroph  3. population
2. community    4. producer
The map below shows the location and diameter, in kilometers, of four meteorite impact craters, A, B, C, and D, found in the United States.

What is the approximate latitude and longitude of the largest crater?

(1) 35° N 111° W  
(2) 39° N 83° W  
(3) 44° N 90° W  
(4) 47° N 104° W
The diagram below is a map view of a stream flowing through an area of loose sediments. Arrows show the location of the strongest current.

Which stream profile best represents the cross section from A to A’?

A A' A A'  
(1)  

A A' A A'  
(2)  

A A' A A'  
(3)  

A A' A A'  
(4)  

The diagram below represents a landscape area.

The main valley in this landscape area resulted mostly from:
1. chemical weathering  
2. volcanic activity  
3. glacial erosion  
4. stream erosion  

Oxbow lakes are generally formed by:
1. erosion, resulting in a sudden increase in the stream’s gradient  
2. deposition, resulting in a sudden increase in the stream’s gradient  
3. erosion along the outside banks of the curve in a meandering stream  
4. deposition along the outside banks of the curve in a meandering stream
In another activity, round, oval, and flat aluminum particles with identical masses were dropped individually into the tube. Which table shows the most likely average settling times of the different-shaped particles?

(1)  

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<th>Particle Shape</th>
<th>Average Settling Time</th>
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<td>Round</td>
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<tr>
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(2)  

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(3)  

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<td>5.1 sec</td>
</tr>
<tr>
<td>Flat</td>
<td>6.7 sec</td>
</tr>
</tbody>
</table>

(4)  

Quartz particles of varying sizes are dropped at the same time into deep, calm water. Which cross section best represents the settling pattern of these particles?

(1)  

(2)  

(3)  

(4)
The maps below show changes occurring around a small New York State lake over a 30-year period.

Which graph shows the probable changes in the quality of ground water and lake water in this region from 1967 to 1997? [Ground water is water that has infiltrated beneath Earth’s surface.]

Key:

<table>
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<th></th>
<th>Lake water</th>
<th>Ground water</th>
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<tbody>
<tr>
<td>Good</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Poor</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

(1)

(2)

(3)

(4)
Which graph shows the most probable effect of environmental pollution on the chances of human survival?

(1)  

(2)  

(3)  

(4)  

In order to preserve the biosphere for future generations, humans must

1 make use of technology to develop new herbicides
2 put all wild animals in game preserves
3 explore ways to drain and fill wetlands along the seacoast
4 understand how living things interact with their environment