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Brown University BA Biology 2004

Undergraduate Teacher Education Program

Teaching Portfolio

The following is an electronic collection of work completed during student teaching (Aug-Dec 2003) at Mount Pleasant High School in Providence, Rhode Island. All entries correspond with standards set by the Brown University Teacher Education Program.

Standard 1: Roles and relationships

Reflect on the Standard: Roles and Relationships

A. Relationships with Students

- Organize resources, materials, and physical space allocated to support active engagement.

Each student in my classes has a composition book (Artifact 1) and folder designated solely for biology. These materials remain in hanging folder box in the classroom when they are not needed for homework assignments or at home studying. All of the students are in the routine of coming into class, gathering their materials, and setting up their notebook page for the day. Each day, students record the date, the topic question, and the agenda. This method has helped students to settle down before class begins and also encourages accurate record keeping.

Students are familiar with their assigned seats, but adapt readily when desks are moved into small groups, pairs, or when work needs to be completed at lab tables. The small size and permanent nature of lab tables made classroom set-up a challenge at first. Luckily, however, the students are cooperative and willing to work together to rearrange seats as necessary. We are now capable of arranging the room as needed, completing the day's activity, and (usually) returning the room to its original state, either through arrangement or clean up, by the end of the period, with minimal deviation from the day's objectives.

Many times, large numbers of students come to my classroom, both before and after school, as well as during lunch to ask questions, get extra help, or just work on homework. I have come to believe that these students are comfortable in my class and see the environment as a place where they are able to work. I do realize, however, that there are some students who do not feel this way. I would like to have increased contact with the students who have not actively sought out my attention.

- Create a safe and secure learning environment for all students.

In addition to providing students with the necessary tools for academic success, I also attempted to create a classroom conducive to learning. Every effort was made to include the contributions of the students in the physical and theoretical design of the classroom. Student work (Artifact 2) was clearly displayed in great numbers and students worked to keep the classroom in proper working order. Students were responsible for cleaning the classroom at the end of each period. Further, students creating disturbances in class (coming to class late, etc) were assigned an additional cleaning duty after school. This method proved effective, as student-generated "mess" began to decrease. When students

saw that they were responsible for cleaning the room, trash was often picked up and fewer students wrote on the desks.

- Make a consistent effort to understand each student's learning and cultural background as well as needs.

Almost all of my students come from a cultural background that is different from my own, and many of these backgrounds differ greatly among students as well. Additionally, my classes are composed of a wide range of ability grouping. Many times, I feel that I do not know where my students are coming from on many levels. In most cases, my students will speak up if they are unfamiliar with some portion of the material, if something is too difficult, if we are moving too quickly, or if they just don't understand something that I am talking about. I am pleased that my students are comfortable enough to voice these concerns in the classroom setting.

In order to cater to different learning needs and ability levels, I have tried to work different levels of challenge into various assignments. For example, I always conduct writing assignments in the same manner. Once the material has been presented in a variety of ways, the students are presented with a writing question. Their first task is to complete a graphic organizer for the assignment. These organizers are provided to each student, and the form is consistent across assignments. While this technique may be primarily used for students with limited proficiency, I have found that all students benefit from the organization that it provides. Next, the students convert the organizer into paragraph form, forming the body of the essay. Once the content of the essay is explicitly spelled out, students add an introduction and a conclusion. This is the opportunity for more advanced students to extend their skills. A more talented writer or a student with a firm grasp on the material can contribute information or style above and beyond the standard.

I have found that this method provides every student with both the necessary support and the welcome freedom. It is important to me that every student be afforded this opportunity, regardless of specific need and free from stigma or stereotype. I believe that, just as every student benefits from organizational skills and prewriting, every student deserves the opportunity to experiment with the artistic and expressive side of writing. The combination of these techniques into one type of assignment demonstrates that every student has the tools necessary to achieve a "personal best" product.

A. <u>Expectations of Students</u>

- Make demands of students in the interest of their learning and their learning styles. Are there high expectations for all students? Are students expected to take responsibility for their own learning?

I try to make every effort to avoid assigning "busy work" to my students. As much as I want them to take their work seriously, I want all work to be serious work. In the past, I have justified the "why" behind assignments to myself, but I think that I may not have conveyed this clearly to the students. When they ask "Why are we doing this?", I am able to fully explain my reasoning, and usually find agreement but I think that this should be made clear from the onset. Students shouldn't need to ask "Why" in these situations, it should be clear from the beginning.

Recently, during a lab activity, all students were to record the directions for each station in their notebooks (Artifact 1) before completing the experiment. I chose this task because I wanted students to personally write out what was to be done before beginning. This lab involved some mildly hazardous chemicals, and I wanted to be sure that each student knew the safety precautions and expectations associated with the lab. I thought that the physical process of rewriting the directions would help to instill these ideas in the students.

During the lab, several students expressed that they were frustrated with this task and wanted to begin the lab right away. A few students said that I should have provided each one of them with a packet for them to write in. One student even mentioned that they probably had to do this because the copy machine was broken. After hearing these comments, I realized that while my expectations were clear, my reasoning could have been better expressed. Once I realized this, I called the class together to explain the above reasoning. When I explained why we were doing this, and reminded the students that, in the past, they have had trouble following written directions they agreed that they were more likely to remember what they wrote. After this point, the remainder of the class went smoothly.

A. <u>Relationships with Colleagues and the School Community</u>

- Work with fellow teachers.

Daily observations have provided a vehicle for conversations with other teachers. By physically being in other classrooms everyday, I have had the opportunity to talk with many teachers about different issues.

The guidance counselor I observed also works as the Cross-Country coach. Coincidentally, I have many students who are running this season. During my observation time, I was able to discuss these students' progress, both in and out of the classroom. I learned that one of my students was recently tested for special needs and was found to have a very low reading level. We also discussed this student's strengths and goals for the school year. Another student was having some trouble with her family outside of school. I learned of this situation, and we discussed some techniques and strategies that could help this student to keep her focus on school.

Overall, I was able to obtain some very valuable information about many of my students. I was also able to develop a relationship with a colleague that has helped both my students and myself. Now I know that if I need a particular student to stay after school to make up work, the student cannot claim that she needs to go to practice. I know that the coach will support my call to have the student focus on academics first. Also, I am glad to know another faculty member who has close contact with these students. I feel that if I ever had a question about one of their behavior or performance I have another resource to discuss the issue at hand.

This experience has demonstrated the value of sharing information with other teachers. Many 9th graders at Mount Pleasant have been placed on teams to help them transition into a high school environment. After seeing the benefit that these conversations can have, I believe that every student could benefit, on some level, from being placed on a teaching team.

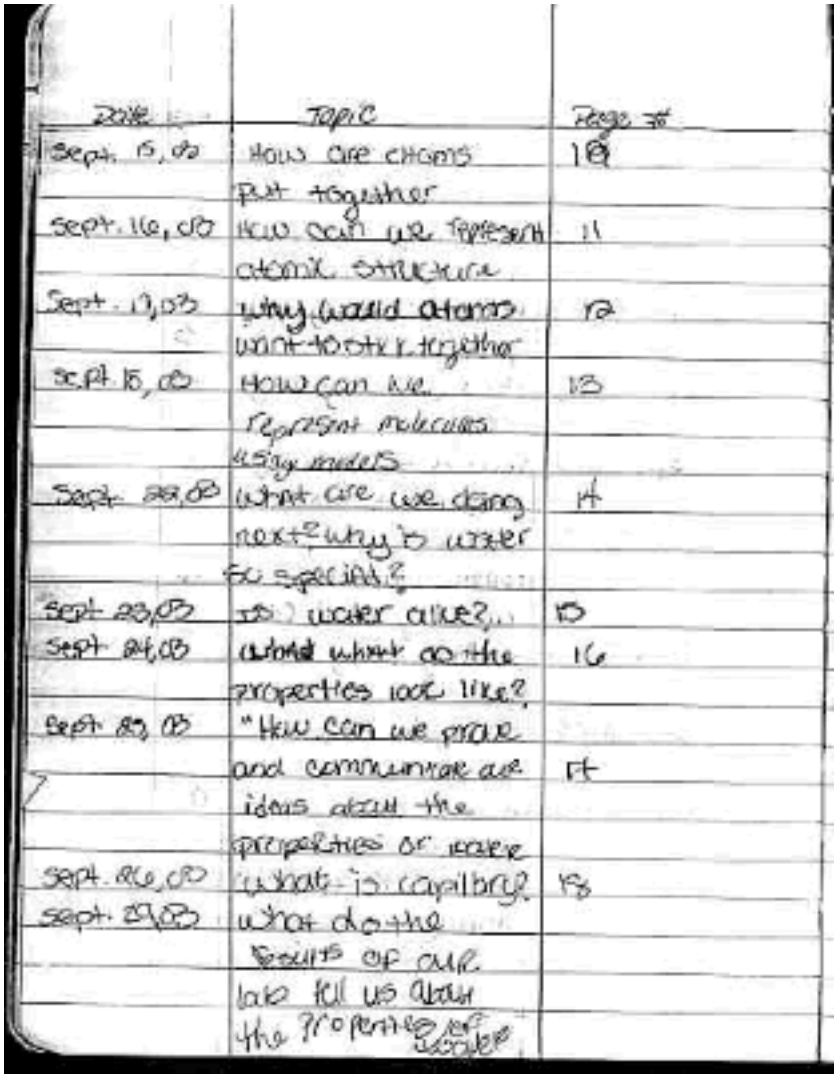
- Interact professionally, fairly, and equitably with students, colleagues, and parents.

On the first day of school, a letter (Artifact 3) was sent home to all students outlining the policies and expectations for the course. The bottom portion of this letter was signed by a parent or guardian and returned. With the exception of only a few students, everyone returned their letters within the allotted time.

Half way through the quarter official progress reports were sent home by the school. Students were assessed as "S", satisfactory or "U", unsatisfactory. School policy states that all progress reports are to be signed by a parent or guardian and returned.

Family night at Mount Pleasant serves as an opportunity for parents and guardians to come to the school to pick up their children's report cards. Historically, this has been the only purpose of the evening for many families. Despite the fact teachers are in their classrooms for an "open house", very few parents venture beyond report card pick up. In order to combat this attitude and to strength school-home relations, a second letter (Artifact 4) was sent home a few days before family night. The purpose of this letter was to personally invite each student's family to the classroom.

Artifact 1: Students' Daily Notebooks



Date	Topic	Page #
Sept. 15, 03	How are atoms put together	10
Sept. 16, 03	How can we represent atomic structure	11
Sept. 17, 03	Why would atoms want to stick together	12
Sept 18, 03	How can we represent molecules using models	13
Sept. 22, 03	What are we doing next? Why is water so special?	14
Sept 23, 03	Is water alike?	15
Sept 24, 03	What what do the properties look like?	16
Sept 25, 03	"How can we make and communicate our ideas about the properties of water	17
Sept. 26, 03	What is capillary	18
Sept. 29, 03	what do the results of our lab tell us about the properties of water	

Reflection on Artifact 1:

Keeping a precise record is an important step in the scientific process. By keeping a daily notebook, students are reminded of the importance of organization. Each day, students date their notebook, copy down the day's question, the agenda, and the homework as soon as they enter class. Any notes or lab work is also recorded under the appropriate date. Seen above is a copy of one student's table of contents, a vital part to the notebook. All students are instructed on how to set up and maintain a table of contents. This serves useful during open notebook tests, when students must rely on their own organization skills to recover information.

The practice of keeping a notebook also establishes routine in the classroom. Students have a clear understanding of what they are to do as soon as class begins, and sometimes even before. Also, keeping a tangible record of work is useful when creating a

portfolio or documenting a student's progress over the course of a semester, or longer.

Artifact 2: Display of Student Work

Reflection on Artifact 2:

The photo on the left depicts a bulletin board display on student work. Students worked independently to create a visual representation of various cell organelles on an index card. These pieces were collected and displayed. Throughout the remainder of the cell unit, the picture were constantly referred to, removed, and passed around, as we discussed each organelle. Also, the student responsible for creating each card was regarded as the "expert" on that particular organelle, a designation that proved useful during both class discussions and group work.

The posters displayed above the windows (right) are the result of an inquiry lab (See Standard 2 Artifact 2). Students created posters in place of written lab reports. These posters were displayed for family night. Parents and other visitors were encouraged to look for their child's poster and view the class's work. Students were informed of the audience when the project was assigned, and many stated that they wanted to make these posters look nice for the parents.

Artifact 3: Introductory Letter

Mount Pleasant High School
434 Mount Pleasant Avenue
Providence, RI 02908
August 28, 2003

My name is Ms. Kelly Stellmach and I will be your child's biology teacher for the 2003-2004 school year. Today, your child received a paper explaining the expectations and grading policy for my classroom. I have encouraged my students to share this information with their guardians. Below is an outline of these policies.

- Students are expected to be on time and prepared everyday.
- It is understood that students will participate in class activities in a respectful manner.

Homework: All homework MUST be turned in on the day that it is due. If your child does not understand the homework or finds that he/she needs additional help, he or she may come after school. Homework assignments may be done over provided that the student handed in a first attempt on the original due date.

- No late work will be accepted.
- After work is returned, the student may make corrections (a "do-over") and turn it back in for additional points. No attempt = No do-over!!

Grades: 50% = Class work, participation, and notebook.
30% = Projects, tests, and quizzes
20% = Homework

Tests: If your child fails a test, he or she may come after school for extra help. If your child comes for extra help, he or she will have 5 days to retake the test.

Absences: If your child is absent with good cause, he or she will have 5 days to make up any missed work. If your child has a planned absence (i.e. court date, doctor's appointment or family obligation) please let me know in advance so that I can provide the appropriate work.

With the appropriate planning and effort, your child should not have a problem achieving success in my class. I am looking forward to working with you and your child over the coming months. If you have any questions about these policies or your child's performance in class, please feel free to contact me (401)-456-9183. Thank you for your time.

Sincerely,

Please sign and return the bottom portion of this sheet.

I have read and discussed the above polices with my child.

_____ (Guardian's Signature) _____ (Child's Name)

Reflection on Artifact 3:

This letter was sent home on the first day of school. It was meant to introduce both students and parents to their child's classroom. While we spend some time in discussing the contents of the letter, as well as other administrative issues, I felt that it was important to give parents a hard copy of what was discussed. Surprisingly, almost

all of the students returned the signed form within a few days.

The signed letters came in hand much later in the semester. On family night, a student's father came in, very upset with the grade his daughter had earned for the semester. As we looked through the grade records, we found that his daughter had passed all of her tests, but had failed to turn in all of her homework and most of her class work. The father was outraged that his daughter had failed. Despite my explanation of the grading policy, he refused to back down, claiming he was never made aware of this. When I produced the above letter with his signature on it, the situation was (temporarily, at least) resolved.

This experience demonstrated the importance of documentation and communication between families and school.

Artifact 4: Family Night Letter

Dear Parent/Guardian:

This letter is to remind you that Mount Pleasant High School will be holding its family night and report card pick up on **Thursday night, November 20, 2003 at 6 pm**.

In addition to visiting your child's homeroom to collect his or her report card, I would like to encourage you come visit your child's **Biology Classroom, Room 314**.

Each parent, guardian, and family member is personally invited to come up to room 314 on the evening of the 20th to discuss your child's progress and view samples of student work. If you are unable to attend, or have specific questions regarding your child's progress or performance, please feel free to call the Science Office at Mount Pleasant High School. (401) 456-9183

I look forward to meeting you soon.

Sincerely,

Ms. Kelly Stellmach
Your Child's Biology Teacher

Please sign and return this form indicating that you have received your invitation to Family Night at Mount Pleasant High School. **Biology Room 314- Ms. Stellmach**

Name of Student: _____

Class Period: _____

Name of Parent: _____

Parent Signature: _____

Reflection on Artifact 4:

Despite the fact that the school also contacts families about this event, attendance at family night is historically poor. Parents tend to come to the school to collect report cards, and often leave, never venturing up the stairs to the classrooms. The return rate on this letter was, not surprisingly, not as high as that of Artifact 3. Many students were upset at the fact that I wanted to speak with their parents. I tried to reassure them, telling the class that I would say at least one nice thing about them if I got to see their parents.

In the end, I saw parents of about 1/3 of my students. This was much more than I expected, and much more than most classes saw. I found meeting with the parents to be a valuable experience. After meeting the families, I felt that I had much more of a connection with the students. I knew whose house I could call, as well as a little bit about what life at home was like for my students. And it didn't hurt that my students knew that I had spoken with their parents.

Standard 2: Students as Learners

Reflect on the Standard: Students as Learners

- Challenge learners to develop higher level cognitive skills.

One of our "end of unit" tests (Artifact 1) proved to be quite a challenge for the majority of the class. This was because the test was not in traditional multiple choice/true false/short answer form. Instead, students were asked to use their writing skills to apply their knowledge to a new situation. We had spent several class periods examining the role that chemistry plays in the human body. Their unit evaluation was to use this knowledge combined with the data provided on a Gatorade bottle to answer the question, "Is this label scientifically accurate?"

At first, students were upset because, despite advice to focus on the human applications of our lessons, they chose to memorize the facts on their review sheet. I ended up allowing those students who completed a review sheet to use it during the test as a resource and a reward for completing the assignment. Once the students began working on their writing organizers, their ideas began to take shape. Many students produced coherent and accurate essays detailing their opinions of the product.

I plan to use this assessment technique in the future because it provided students with a more relevant application for their learning. Those who were successful were surprised with what they were able to understand, and most students ended up with more questions about Gatorade than they had when they started. With adequate feedback and the opportunity to rewrite the essay, I think that my students can become better at the task of "application". I hope to extend this method so that all students understand how

their learning is relevant and are provided with the opportunity to make such connections.

- Engage learners in generating knowledge, testing hypotheses, and exploring methods of inquiry and standards of evidence.

One of the biggest challenges for the class was an organic chemistry lab that took place over several days (Artifact 2). The conclusion of this lab was an inquiry based assignment in which each group of students designed their own protocol and was responsible for interpreting their own results. These labs showed the students that they were perfectly capable of working independently to create important, relevant work.

Upon completion of this lab, students were asked to evaluate their own work against the standards specified in the initial assignment. It was surprising to find that students were not only very honest about the quality and completeness of their work, some were exceptionally hard on themselves. Many students gave themselves grades lower than I would have. Also, students seemed to honestly describe the amount of effort they put into the lab, and reflected this effort in their own grades.

- Create learning groups in which students learn to work collaboratively and independently.

We recently completed a group work assignment designed to familiarize students with the different types of organic compounds (amino acids, proteins, and lipids). Other compounds were covered in various class activities. Each group was composed of four students, and each student was assigned a prescribed role. Roles were as follows: Recorder: responsible for writing out the questions and answers as dictated by the group. Artistic Director: responsible for coming up with a poster design and completing additional art work when necessary. All students were encouraged to draw some part of the poster. Chemist: responsible for ensuring that the correct chemical structure is accurately portrayed on the poster. Presenter: responsible for organizing and leading a 3-5 minute group presentation. Each student was responsible for fulfilling one of these specific roles, as well as contributing in some way to each part of the project.

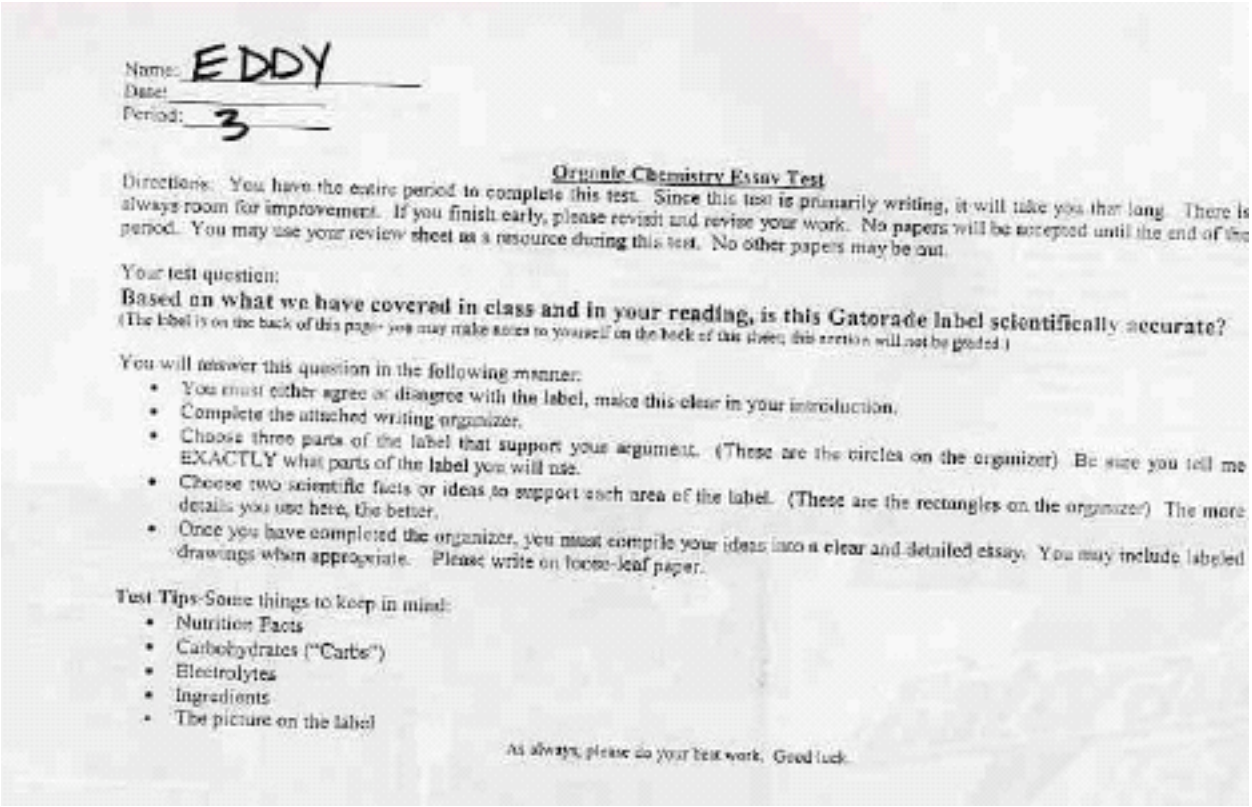
The group work aspect of this project worked very well. The assigned student groups were effective and students seemed to enjoy working together and looking up information. Role assignment was also effective because it enabled students to take ownership of a certain aspect of their project. Students became very possessive of their roles and worked hard to ensure quality.

The presentation aspect of this project, however, was not as successful. During group work time it appeared that students were gaining a firm understanding of the material. Once they were to share their information, they struggled quite a bit. Student

presentations were unclear and failed to demonstrate learning. At first I was confused as to why students were able to explain their knowledge on the individual level but could not share this with the class. After further probing, I found that many students were inexperienced when it came to class presentations. In order to reflect on this experience, I had students complete a journal entry (Artifact 3) listing "3 things they would do differently in their own presentation, 2 things they didn't understand about someone else's presentation, and 1 thing they like or disliked about this project". Not surprisingly, most students recognized that they needed to speak louder and be more organized. In the future, I will need to provide students with more detailed expectations and explain thoroughly what an excellent presentation will contain. Hopefully, next time students will combine this experience with clear expectations and the presentations will be more successful.

- Encourage learners to evaluate their own work and use the results of self-assessment to establish individual goals for learning and improved performance.

Artifact 1: "Gatorade" test



Name: EDDY
Date:
Period: 3

Organic Chemistry Essay Test

Directions: You have the entire period to complete this test. Since this test is primarily writing, it will take you that long. There is always room for improvement. If you finish early, please revisit and revise your work. No papers will be accepted until the end of the period. You may use your review sheet as a resource during this test. No other papers may be out.

Your test question:

Based on what we have covered in class and in your reading, is this Gatorade label scientifically accurate?
(The label is on the back of this page- you may make notes to yourself on the back of this sheet, this section will not be graded.)

You will answer this question in the following manner:

- You must either agree or disagree with the label, make this clear in your introduction.
- Complete the attached writing organizer.
- Choose three parts of the label that support your argument. (These are the circles on the organizer) Be sure you tell me EXACTLY what parts of the label you will use.
- Choose two scientific facts or ideas to support each area of the label. (These are the rectangles on the organizer) The more details you use here, the better.
- Once you have completed the organizer, you must compile your ideas into a clear and detailed essay. You may include labeled drawings when appropriate. Please write on loose-leaf paper.

Test Tips-Some things to keep in mind:

- Nutrition Facts
- Carbohydrates ("Carbs")
- Electrolytes
- Ingredients
- The picture on the label

As always, please do your best work. Good luck.

Grading: This test is worth 100 points

Writing Organizer: 29 points

Essay Content: 51 points

- Gatorade Label referred to accurately- 5 points (15 points total)
- Correct scientific evidence cited- 6 points (36 points total)

Quality of Writing: 20 points

	20 points	15 points	10 points	5 points	0 points
Quality of Writing	Student uses proper grammar, good spelling, and complete sentences. Few, if any, errors are found.	Student's paper is organized and flows well but grammatical or spelling errors exist.	Writing may possess a few organizational errors. Some grammatical or spelling errors exist.	Writing does not make sense. No paragraphs are used or parts of the essay are unreadable. Spelling and/or grammatical mistakes are numerous.	Handwriting is too sloppy to read or paper is not written on the appropriate topic.

Introduction: 5 pts– Do you agree or disagree with the Gatorade label? I agree w/ this lable it gaterade contains water + sugar it can give us water for dehydration and sugar for energy.

1\. sugar
sugar makes you hyper and it'll boost your energy
Having sugar in energy

used once reading we got energy from food and sugar is in some foods we eat like gatorade

calories from Dives from [?] sugar burned

2\. carbohydrates
main source of energy
carbohydrates have to do with sugar
gaterade contains 14g of carbs

again from my worksheet there is evidence that carbs are main soures of energy

carbs + water are both important to our lives
with out carbs we suffer from low energy and we can die
and with out water dehydration kills us too

3\. water
water is a natural resource
with out it we can't live

from class work + home work I learned with out water our whole system shuts down.

29/29

KEY

Areas of the Gatorade label you will use.

Scientific evidence you learned in class

How these ideas are connected

Conclusion: 5 pts– Why was this important?
water pure
gatorade is not
more things in it and more the better.

79/100 Per 3 +7pts extra credit (= 86/100)

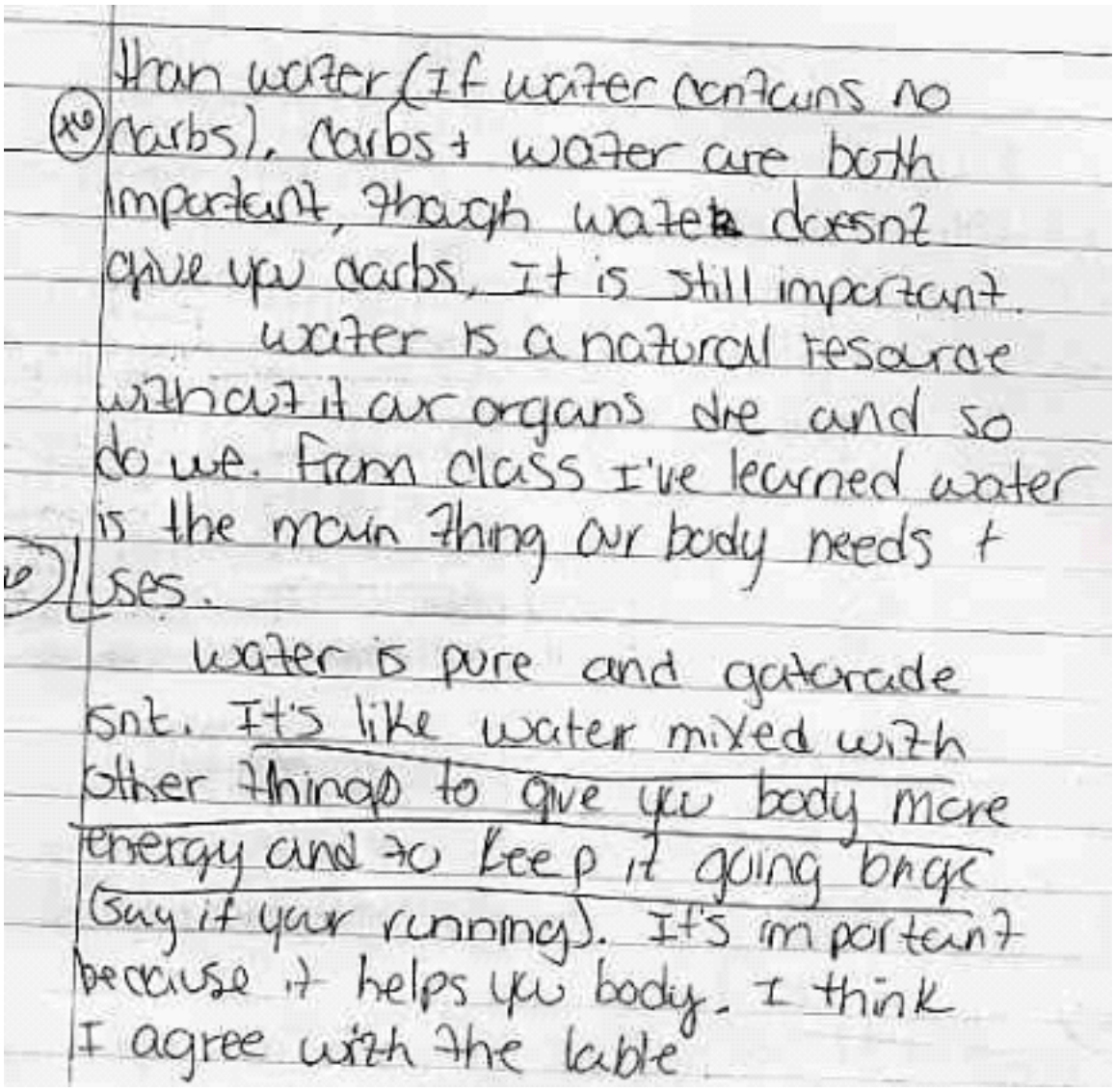
Genie D Bio test. 10/14/05

I agree with the lable. I think if gatorade contains water and sugar it can underhydrate us and give us energy at the same time. Even though I don't like it I believe its better than water and here's why.

I'm glad that you were able to look past this to be objective and not let your personal taste influence you.

Sugar makes you hyper (depending on how much you had). Hyperness is a sign of energy. So that shows that sugar gives you energy. I also know (+9) because the readings we did in class say so. Sugar is known to boost your energy. there has to be a balance of sugar in you body. If not it may cause you to get diabetes. thats when you have to watch the amount of carbohydrates you eat, to help maintain you bodys health.

(+2) Carbohydrates are our main source of energy. Carbohydrates are (+5) in gatorade about 14 grams or .1. that right there shows that the Gatorade gives you more energy


than water (If water contains no carbs). Carbs + water are both important, though water doesn't give you carbs, it is still important.

water is a natural resource without it our organs die and so do we. From class I've learned water is the main thing our body needs + uses.

water is pure and gatorade isn't. It's like water mixed with other things to give you body more energy and to keep it going longer (say if your running). It's important because it helps you body. I think I agree with the table

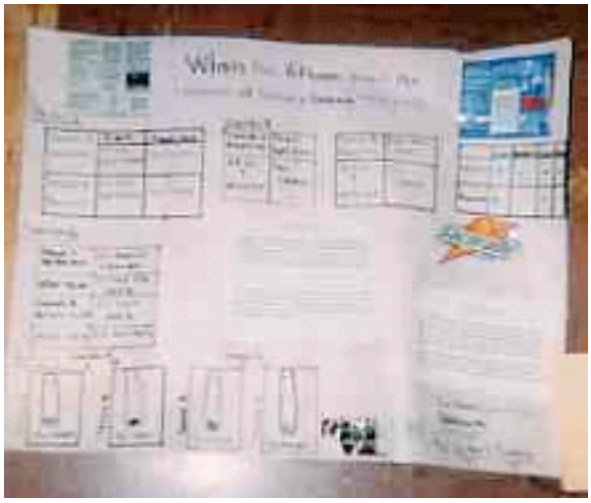
Reflection on Artifact 1:

This test was the first instance in which students were accountable for higher-level thinking. Prior to this exercise, questions were posed and students were prompted, but never before was a complex written produce the result. As a result, students found this test to be very challenging. Most sought a "right" or "wrong" answer, and had difficulty with the fact that either answer could be considered "right" because the emphasis was on the written argument.

Despite their struggles, most students ended up doing well. Even if the essays did not exhibit high quality writing, there was evidence of deep thinking in the skeletal arguments and in the writing organizers. Surprisingly, the students who did best on this task were the ones who do not typically excel at academic work. The test served as a real

attention-getter for the students who are not normally as engaged. These students took the challenge seriously and surprised themselves, as well as me.

Artifact 2: Inquiry lab

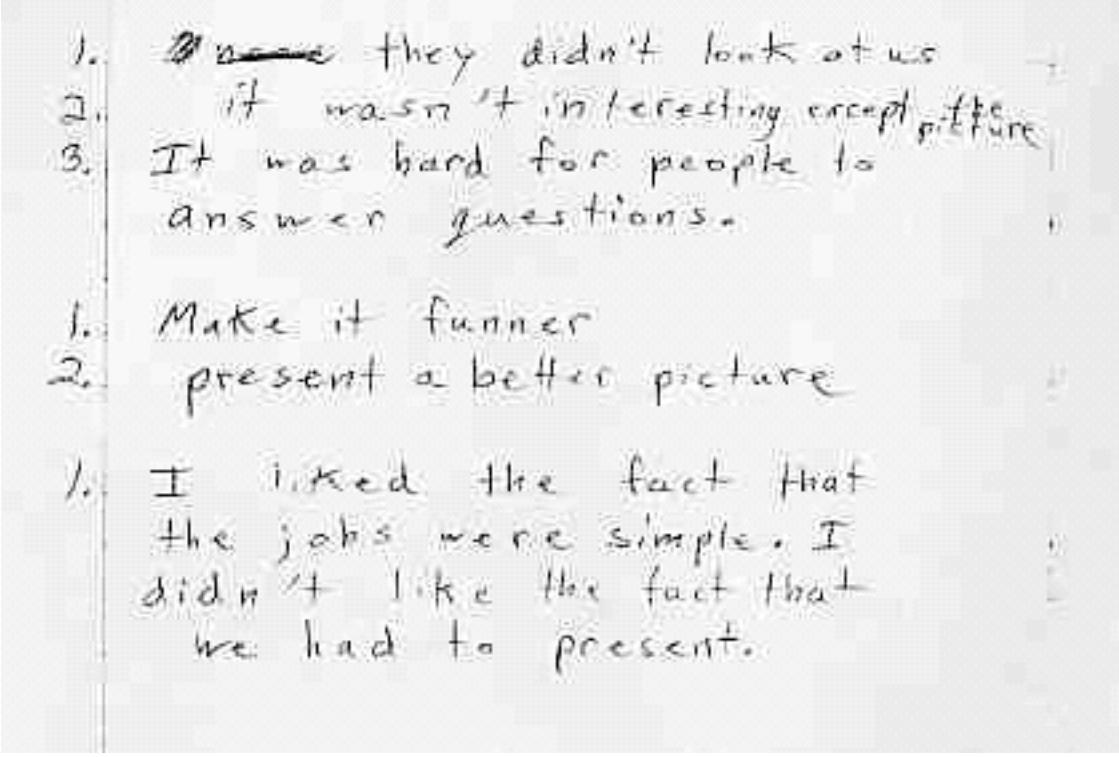


Reflection on Artifact 2:

This lab was the first exercise in inquiry for my students. After several steps of scaffolding, they worked independently (in groups of 2 or 3) to develop and research their own questions. First, students needed to propose a research question that could be answered by some combination of the four tests we covered in class (sugar, starch, lipids, and proteins). Along with the research question, a rationale was submitted, explaining the importance of their question. If the rationale was convincing, their project was 'approved" and they began writing out the steps. Students were reminded that the steps should be clear enough for anyone to follow. Once students had a sound question and clear steps, they completed their experiments. The lab report was presented in a poster

format, summarizing their data and providing a conclusion, or an answer to their question. These posters were displayed in the classroom on family night.

Artifact 3: Journal entry



Reflection on Artifact 3:

This journal entry is an excerpt from a reflection on group presentations. The opinions presented in this particular journal were shared by a majority of the class. The first question asked students to brainstorm three things that they did not like about the presentations they saw. The second prompt asked students to list three things they would have liked to do differently in their own presentations.

Overall, the students were honest about their own performance. This reflection reminded students that their peers where the predominate audience for the presentations. When thinking about what they didn't like in the other presentations, they were also able to see their own presentations through the eyes of the audience.

Artifact 4: Student Self Assessment

Names: Patrice and Cinnie
Date: 10-31-23
Period: 3
Project Topic (or lab question): Does bread contain lipids

Poster Project: Evaluation Form

Directions: Listed below are the requirements for your poster. These were given to you before you began the assignment. Please assign yourselves the appropriate number of points (in the student section only) for each section that you have completed. When you are finished, please add up your points. **Work with your partner or team to do this. You only need to turn in one sheet per group.**

(Ex: 15=excellent, 10=good, 5=attempted, 0=missing)

Does your poster have each of the following?	Points	Students	Teacher
Your research question	15	15	
A paragraph explaining why you chose this topic	15	14	
The steps you used to complete the lab	15	16	
Your data table	15	13	
Evidence of outside research (1 per person)	15	15	
Conclusion Paragraph	15	10	
Creativity and Presentation: On a scale of 1 to 10, How nice does your poster look?	10	10	
Total:	**100**	89	

Please think about the work you've done over the past several days as you answer these questions.

1. If you could change one thing about this ASSIGNMENT (what you were asked to do), what would you change?

We would also like to have tested for sugar.

2. If you had this to do over again, what would you do differently about your PROJECT (your question, lab, poster, etc.)?

Test the bread for sugar and use different poster board

3. How hard did you work on this project? Was it difficult? Too easy? Did you enjoy doing it?

I think me and Cinnie worked hard and it wasn't easy or difficult but enjoyed doing it

Reflection on Artifact 4:

This artifact represents one group's self-assessment on their inquiry lab. At the onset of the lab, students received a list of required elements, along with their point value. Students were then asked to reflect on their work and compare it to the initial standard. Each group was to assign points to themselves based on the collective opinion of the group. Originally, I had intended to also assign points as I felt appropriate (in the column titles "teacher). After reading the student responses, however, I decided against this step and gave each group the grades they assigned themselves. For the most part, students were right on target with the grade I would have given them. In the cases where the students' grades did not align with mine, students gave themselves fewer points that I would have, citing lack of effort as the reason. Given these results, I thought that it would be in the best interest of the class to see that their input counted and that they were all be measured against the same standard.

Standard 3: Planning

Reflection on the Standard: Planning

- Prepare a variety of learning activities chosen in order to accommodate different learning styles and a diverse group of students.

Up to this point, I have tried to vary assignments and techniques in order to make the information accessible to various types of learning styles. We often cover the same material over several days only it is presented differently. For example, we spend a unit learning about the properties of water. One of the main lessons here was for students to understand that, while water itself is not alive, it does support life. On the first day of this unit, the students took notes from a DTP connecting previous chemistry knowledge to water and its importance. Over the next couple of days, students completed independent readings and compared notes in pairs (Artifact 1). There was also a lab activity that allowed students to witness and manipulate water under a variety of circumstances. This unit was finalized through an essay assignment asking students to discuss the above topic (Artifact 2).

I chose to implement this variety with the intention of providing all students with the opportunity to do well. I have also mandated the various techniques in order to teach students that they will need to challenge themselves in some areas. In the future, I would like to occasionally allow students some choice in how they approach new material. Now that they have been exposed to all of these various methods, they should be able to determine which they like the most and which is the most beneficial. While constant choice may not push the students to overcome challenges, occasional choice, or the distribution of an element of choice may encourage students to take responsibility for

their own learning.

- Use written plans. Are these an accurate guide to what actually happens in class?

I have been consistently and thoughtfully using the prescribed lesson plan template. I find this process to be helpful in working through the reasoning behind my lessons, as well as working out the logistics of such things as taking attendance and distribution of materials. In planning, I am always concerned that we will complete the lesson long before class is over, leaving students with nothing planned. As a result, I tend to over-plan, cramming too much into one day.

On one day in particular, I tried to complete three activities during first period. First, we did a complicated reading on carbohydrate structure. This was followed by an experiment documenting the break down of a saltine cracker from starch into sugar. Finally, we tried to construct a model of a sucrose molecule out of gumdrops. This class (45 minutes long) was very rushed and, while the students were cooperative and went through the motions of the assignments, it was clear that they did not know why they were doing these things. In third period, I decided to break down the lesson, doing only the reading and the saltine cracker experiment in the first day. This set up allowed us much more time to reflect on the information and examine the lab more closely.

Initially, I addressed this problem by attempting to rush activities and move through the lesson plan. After doing this for a few days, I noticed that it was overwhelming for the students. Now, I write my lesson plans in the same way, but I am more open to the idea of extending an activity into the next day of class. Usually, I will plan a lesson for the day, knowing that some of the activities may be continued on the next day. I try to order my activities to allow for more flexibility in day-to-day planning. I believe that, in time, I will become a better judge of what expectations are reasonable in one class period.

- Convert ideas and materials into teachable lessons? Into larger units- or an entire course? Are there clear connections, patterns, and themes?

At the end of the student teaching semester, the classes completed a "unit plan" based on human anatomy and muscle physiology (Artifact 3). These lessons provided a much needed connection between the previous material of the course (especially organic chemistry and cells) to the human body. Students were able to experience many personal and tangible examples of concepts covered in class.

This unit also provided a great deal of continuity in the classroom because each week, students were given a "road map" for the week, describing (loosely) where we would be going in the upcoming days (Artifact 4). Collectively, all of the road plans served as a calendar for the unit and provided the students with an accurate record of their work.

Artifact 1: Lesson Plan- Reading on Properties of Water

DATE :	*Lesson topic(s) and/or Essential Question(s) EQs: What are we doing next? Why is water so special?*
Objectives	*What will your students know and be able to do as a result of this lesson? Students will: • Reflect on classroom performance • Complete self assessment forms • Be updated as to actual progress • Experience importance of following directions in connection*
	with lab expectations • Begin to read/split log note take on properties of water. (Miller pgs 40 and 41)
Standards	*What standards will be addressed by this lesson? 4D Structure of Matter 4G Forces of Nature*
Instructional materials and resources	*What materials, texts, manipulatives, visuals, etc. will you need for this lesson? What technological resources (if any) will you need? • Self Assessment handouts • Follow directions hand out • Properties of water reading • Grade sheets*
Learner Factors	*How does this lesson accommodate different development levels of students? How does this lesson accommodate individual differences in approaches to learning, create connections between the subject matter and student experiences, and or include provisions*
	for students with particular learning differences or needs? This lesson will provide tangible evidence related to several classroom issues. In order to reinforce following directions, specifically with detail to lab safety, students will experience a s
	situation

Environmental Factors	*What student grouping will be used? What changes will you need to make in the classroom due to instruction, materials, safety, etc., if any? Students will sit in rows for today's activity.*
Instructional activities and tasks	What activities will you and your students do and how are they connected to the objectives? See next page
Assessment activities	*How will you determine what the students know and are able to do during and as a result of the lesson? Students' success will be apparent in upcoming activities. Two goals for today's lesson are: • Students begin to see the importance of following dir*
	ections/begin to act accordingly and • Students are impacted by grade updates in a way that encourages progress/ improvement.

Instructional tasks and activities	*What activities will you and your students do and how are they connected to the*
What will you be doing?	*What will the students be doing?*
September 22, 2003 Topic Questions: What are we doing next? Why is water so special? Agenda: “Quick quiz” Self Assessment Grades! Homework: Read and underline pgs 40-41 on “Properties of Water” Also, complete split log note taking in your notebooks. 8	Students will enter class, collect materials, and copy down the day’s agenda in their notebooks. Students will complete activity Students will listen to the explanation Students will complete the forms. Studen
:35-9:27 10:27-11:19 8:35-8:40 10:27-10:32 Take Attendance 8:40-8:50 10:32-10:42 Distribute “Instructions worksheet” Introduce the activity as a “quick quiz” (class work activity) to see how every one is doing Remind students to “please follow the di	ts will follow along and copy down the information. Students will read and use split log note taking for the reading on “properties of water” Miller, pgs 40 and 41
rections” If you are finished early, please sit quietly. I will collect the quizzes at the end of 10 minutes. No Talking Please! 8:50-8:55 10:42-10:52 Explain Importance of Activity, lots of lab work coming up at the request of classes. Cooperatio	
n is crucial for success and safety. 8:55-9:05 10:52-11:02 Distribute Self Assessments; tell students progress report time is coming up. 9:05-9:15 11:02-11:12 Have students take out policy sheet from first day (in folders) Discuss grading polic	
y Use examples of board to show Homework= 20 percent Tests= 30 Percent Class work= 50 Percent Do several examples on the board. 9:15-9:27 11:12-11:19 Allow students to begin working on their homework	

Reflection on Artifact 1:

The time at the end of this class was dedicated to explaining and beginning the homework. Today's homework assignment was one that the students had completed before, but often need some help getting started. Students are to read the assigned section and complete "split log" notes in their composition books (see Standard 4 Artifact 1). Allowing extra time in the lesson to begin homework provides me with the opportunity to help out particular students. While it is true that some students use this opportunity to complete the homework (thus making it class work), there are some students who need the extra time to complete the assignment, and others who really benefit from one on one explanations and assistance.

Artifact 2: Lesson Plan- Properties of Water Essay

DATE : September 29, 2003	*Lesson topic(s) and/or Essential Question(s) Topic Question: What do the results of our lab tell us about the properties of water?*
Objectives	*What will your students know and be able to do as a result of this lesson? Students will: • Complete lab analysis questions • Begin work on writing organizer • Be able to cite examples of water's properties in life.*
Standards	*What standards will be addressed by this lesson? Communication Scientific Enterprise*
Instructional materials and resources	*What materials, texts, manipulatives, visuals, etc. will you need for this lesson? What technological resources (if any) will you need? • Food coloring • Capillary tubes • White carnations • Salad dressing • Alcohol • Water*
Learner Factors	*How does this lesson accommodate different development levels of students? How does this lesson accommodate individual differences in approaches to learning, create connections between the subject matter and student experiences, and or include provisions*
	for students with particular learning differences or needs? This lesson provides the students with the opportunity to witness and participate in related and interesting demonstrations. Hopefully, students will connect demonstrations with life experien
	ce, thus being able to observe and comment on the properties of water found around them. It will also serve as a reinforcement to have students complete their homework.
Environmental Factors	*What student grouping will be used? What changes will you need to make in the classroom due to instruction, materials, safety, etc., if any? Students who have completed their homework will use their homework answers to witness further examples of water'*
	s many properties. They will work at the back table and record their observations into their lab notebooks. Students who have not completed the homework will do so at this time

Instructional activities and tasks	What activities will you and your students do and how are they connected to the objectives? See next page
Assessment activities	*How will you determine what the students know and are able to do during and as a result of the lesson? Students will receive a homework grade. Those who did not complete it at home will only be eligible for 50 percent. Students will also turn in a*
	completed writing organizer. This will be assessed for understanding before essay writing may begin.

Reflection on Artifact 2:

This lesson plan is an example of variety in the classroom. The activity today, filling out writing organizers (see Standard 4 Artifact 4), acts as a precursor to writing an essay. Writing is used often, in this case, it will be used formally. Students will complete an essay on the assigned topic and turn it in for a project grade. Other times, writing may be brief, such as a journal entry (see Standard 2 Artifact 3).

Artifact 3: Unit Plan

Kelly Stellmach
Instructional Unit Plan

Unit Plan Title: Muscle Physiology and Anatomy

Descriptive Overview: This is a 2 and a half-week unit on muscle physiology and anatomy. The lessons contained in this unit will demonstrate the mechanisms by which cells work together on a microscopic level to produce macroscopic changes. Students will work with muscle function of the cellular and gross levels. Concepts of force, levers and physics will also be incorporated. The final assessment will require students to "play" physical therapist in

a selected case study. Students will be responsible for making recommendations for a fictitious patient based on their understanding of the unit.

Objectives:
Students will:
(Skill)

- Refine their microscope and observational skills
- Continue to build literacy skills applicable to scientific reading
- Create 3-D representations from diagrams and reading
- Be introduced to physics, biomechanics, and the role of mathematics in biology
- Experience dissection, develop good technique
- Read from a variety of sources spanning from popular press to text containing medical terminology
- Apply knowledge to an authentic situation

(Content)

- Relate preceding unit on cells to the human body
- Visualize muscles on levels ranging from cellular to gross
- Work in teams to create visual aids
- Create models of muscle fibers
- Use manipulative to demonstrate joint movement
- Relate muscle differences to observed physical performance
- Deconstruct a tangible representation of the muscular-skeletal system
- Compare muscle/bone function and placement across species
- Examine the effect of age on the human muscular skeletal system
- Research various injuries related to the muscular skeletal system

Essential Question: How do our bodies move?

Guiding Questions:

- What do muscle cells look like? (11/17 & 11/18)
- Why do some people "bulk-up"? (11/19)
- Why does it burn when your body works hard? (11/20)
- How do bones hold us up? (11/21)
- Why can't you bend "backwards"? (11/24)
- How are distance runners different from sprinters? (11/25)
- Do we eat muscles? (11/26)
- Do we have the same muscles and bones as birds? (12/1)
- How do muscles and bones get old? (12/2)
- How do you "hurt" a muscle? (12/3)

Assessment Plan:

Upon completion of the unit, each student will receive a different case study describing a fictional patient with a muscle related problem (either from injury or age). Students will need to draw on their knowledge from the unit and biology in general to write up a recommendation for their patient. They will follow a prescribed outline for developing a recommendation.

Standards:
2C Mathematical Inquiry
3B Design And Systems
4G Forces of Nature
6B Human Development
6C Basic Functions
6E Physical Health
8F Health Technology
11A Systems
12C Manipulation and Observation
12D Communication Skills

Reflection on Artifact 3:

Artifact 3 is the preliminary unit plan for a section on muscle physiology. While a few minor changes took place between this plan, and the actual unit plan calendar (see below), this draft was valuable in guiding the unit. The steps taken to generate this plan are consistent with those of "planning backwards". Planning ahead also helped me to tackle the challenge of fitting a broad content area into less than three weeks of classes. Even though many topics had to be sacrificed, the final product was a nice survey of muscle physiology, and it provided a much needed "human" link for the students.

Artifact 4: Unit Plan Calendar

11/16	11/17	11/18 Test on Microscopes, Enzymes, and Cells/Cell Parts Complete Unit	11/19 Brief intro DTP Literacy "reading Organizer" on	11/20 Microscope Lab in class Family Night	11/21 No School- Professional Day	11/22
11/23	11/24 Physics intro with demos of force and hinge joints Discuss	11/25 Connective Tissue (Tendons and ligaments)- cartilage pg 922-923 and	11/26 Chicken wing dissection	11/27 Thanksgiving - No School	11/28 Thanksgiving - No school	11/29
11/30	12/1 Benefits of exercise Muscle size and	12/2 Slow twitch and Fast twitch examples and comparison-	12/3 Muscular-skeletal system in old age Informational	12/4 Case study-based unit assessment	12/5 Forensics Reading	12/6

Reflection on Artifact 4:

Artifact 4 represents a more final version of the unit plan. This is the amended version of the calendar, and it depicts what actually took place in class each day. At the beginning of each week, students were presented with a forecast, or a plan of what would take place in the upcoming days. This plan was to be copied into their notebooks, and should serve as a record for many reasons. The most valuable use of this calendar was to assist absent students. If a student had missed class, they could easily ask their neighbor what was covered in class the day before. Also, students could see what was coming up if they knew that they would not be in class. This technique took a lot of the pressure off of me, and encouraged absent students to be more responsible for themselves.

Standard 4: Classroom Practice

Development of Student Skills

- Instruct about how to read with better comprehension, how to take effective notes, how to write clearly and coherently. Are the students given models or exemplars to guide their work?

With every new section of reading, we complete "spilt log" notes as a class (Artifact 1). First, students read the section independently and underline any important ideas. If they

come across a work that is new to them, they are to circle it and write what it means in the margin. Students then divide their notebooks into two columns. The left hand side is titled "Important Information" and the right hand side is "Test Questions". After all students have had the chance to read and underline (either during class time or as homework) we compile class notes on the board, listing all the information that was considered "important". Before copying this into their notebooks, students need to say if they "agree" or "disagree" with each point. If there is any disagreement, the student who suggested that fact needs to clarify his or her reasoning. Once all facts have been agreed upon, they are copied into notebooks. Next, students split into pairs. While in pairs, students fill in the right hand column. They brainstorm possible test questions related to each piece of information listed in the corresponding space in the left hand column. Students are instructed to use these notes as a study guide.

This method seems to work well in helping students identify the necessary facts in the reading. Initially, some questionable pieces of information were generated for the left hand column, but the agree/disagree component of the activity allowed students to weed out the unnecessary or incorrect information by themselves. The more times we have done this activity, the fewer disagreements have arisen. Also, the test questions are beginning to take on evidence of deeper thinking. For instance, questions during the first chapter included, "What are the 8 characteristics of life?" and "What is the difference between sexual and asexual reproduction?" In latter sections, students began to generate questions such as, "What is the role of a lipid in your body?" and "What happens to your brain if you stop eating?"

In the future, I would like to refer more directly to the test questions generated by the students. I plan to have them submit their "favorite" questions, and use a few on the test. I think that extending the note taking process to include this element will not only demonstrate the immediate importance of understanding the material, but it will give students a greater level of responsibility and ownership during tests. It is my hope that we can reach a point where the students no longer tests as something that I "give" but as an opportunity to show that they know the material they thought was important.

Laboratory/Field Work

- Teach and adhere to safe procedures and the ethical use of living organisms.

Our very first lab, or hands on experiment, involved recording observations of earthworms in response to a change in the environment. Pairs of students were responsible for one earthworm. They were to add elements of cold, moisture, and darkness to the shoebox that contained the worm. They were then to record the worms' actions in response to the new stimulus. Students were carefully instructed on how to handle and treat the worms in a manner that would not harm them. This activity was successful and all worms survived the ordeal. At first, students were "grossed out" by the idea of touching a worm, but in the end most students overcame their initial fears and

enjoyed conducting the experiments.

Following the experiment, the worms were placed in an artificial environment with dirt and plants. They have remained there since the day we did this activity. Occasionally, students will volunteer to water or feed them. I am not sure how many worms are still alive, but to this day students ask questions such as "Are the worms still in there?" and "How are the worms doing?" We also have two class pets. A small turtle named Carlos that one student brought in for me and a beta fish (who is still in search of a name). The students like to feed the animals on a regular basis. Some even come in after school to check on the animals.

I think that this activity, combined with the regular presence of animals in the classroom, has created a positive and ethical setting for the study of life.

- Encourage scientific thinking through laboratory/field work by hypothesizing, observing, collecting data, analyzing data, and drawing conclusions.

One of our later lab activities was centered on working up to the point where students would be able to independently "think scientifically" (Artifact 2). The content of this lab investigated organic compounds as contained in food. A great deal of scaffolding was used to reach the final step of the inquiry lab. See also Standard 2 Artifact 2.

- Include key questions in the lesson plan? Does the student teacher script an arc of questions for the lesson?

Scripting questions is a technique that initially proved troublesome for me. I had a great deal of difficulty writing down a specific line of questioning to incorporate into the lesson. I found it much easier to ask questions as we went along, specifically having students attempt to answer each others' questions. While the latter worked well, I found that students were not initiating higher level, critical thinking on their own. They did, in fact, need prompting from me.

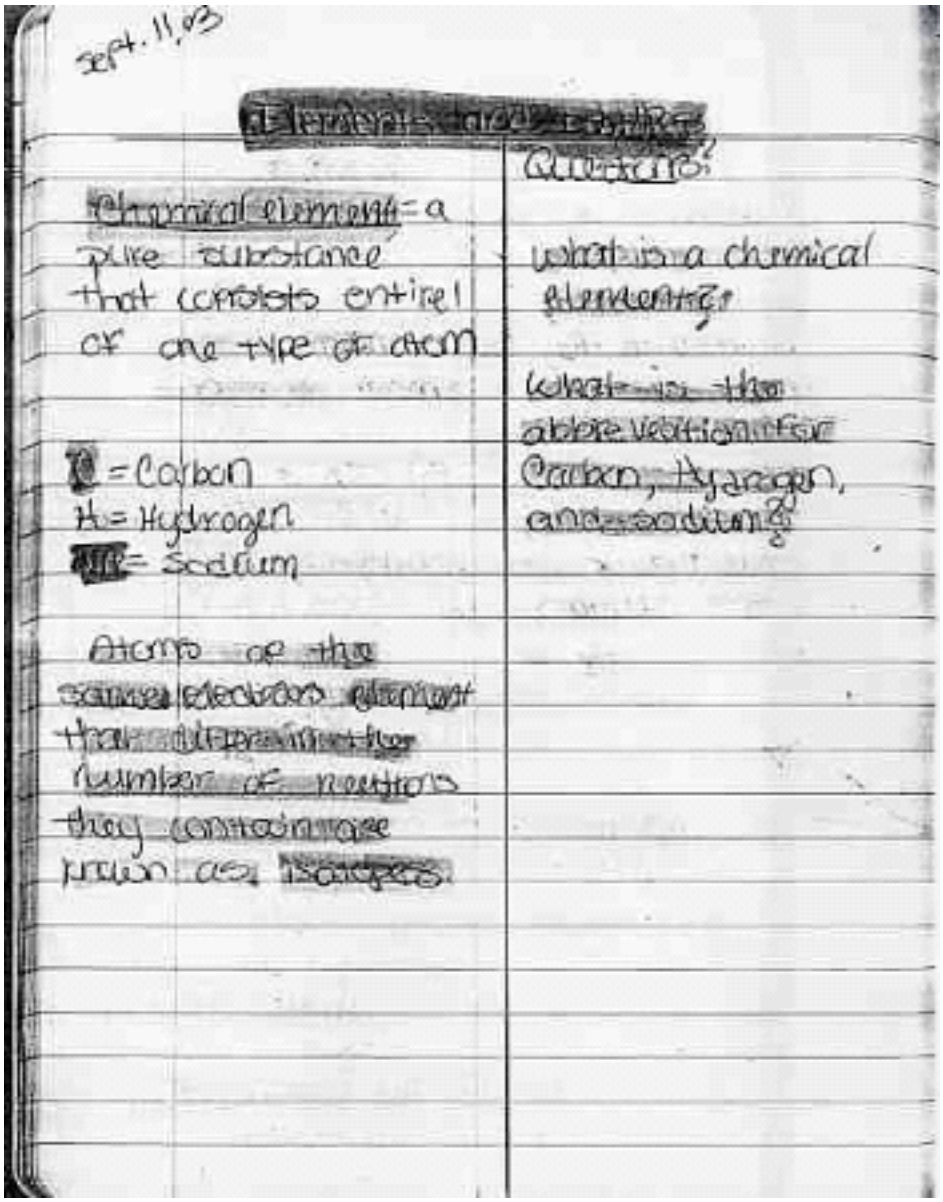
The practice of scripting questions (Artifact 3) did two things for me. It presented more complex challenges to the students, as I had intended, but it also allowed me to make more personal connections between the students and the material.

- Instruct about how to read with better comprehension, how to take effective notes, how to write more clearly and coherently? Are students given models or exemplars to guide their work?

Throughout the semester, many writing assignments were given. All essay-like assignments followed the same format, one that was quickly mastered by the majority of students. Essays were typically assigned to connect one lesson to the next, or to show

the relevance of a main idea. When a new essay topic was introduced, students were first asked to brainstorm individually and then as a class. Once there was an established base of knowledge, "writing organizers" (Artifact 4) were distributed. Writing organizers act much like graphic organizers, providing the structure for the essay, and allowing for students to place the information in the desired order. Over the course of the semester, students completed a number of these writing organizers. As we progressed, the writing organizers became more complex, asking the students to supply more specific examples. Also, successful student examples were provided to the class to serve as a model.

Artifact 1: Split Log Notes

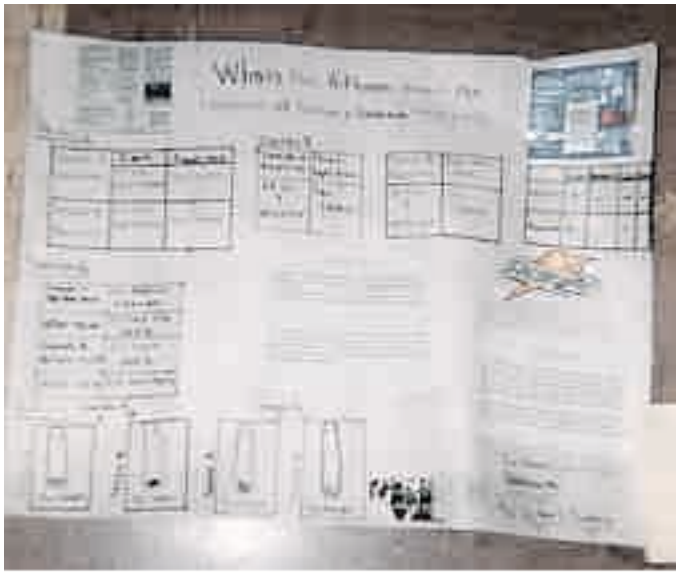


Reflection on Artifact 1:

Split log acts as a template for students to take notes. Often times, students are lost when confronted with a large section of reading and a blank page of notebook paper. Split log provides some structure to note taking, and it also acts as a student guide for the students. For each section of reading, students are to write down some important ideas on the left column, and, in the right column, potential test questions for the section.

This technique works well if student's actual questions are integrated into the test. In this case, students should identify the importance of careful reading. They should also have some ideas as to how to approach a larger reading assignment.

Artifact 2: Inquiry Lab



Reflection on Artifact 2:

(see Standard 2 Artifact 2 for more on the Inquiry Lab) Artifact 2 is an example of some lab work that has been conducted in the classroom. While it is not the only lab work that we have done, it represents some of the most complex. In this lab, students tested food samples for a variety of organic compounds. In many cases, they needed to boil water, heat solutions, and handle chemicals. In order to ensure that proper safety precautions were followed, each student was responsible for copy down a safety explanation for every experiment in his or her notebook. These written explanations were used to ensure that they student did not simply glance over the directions, but internalized the safety such that they were able to put the warnings into their own words.

There were also strict requirements regarding behavior in this series of labs. Students were warned from the outset that we were handling heat and chemicals, and no horseplay would be tolerated. The penalty would be removal from biology lab (and loss of credit) for the quarter. Luckily, students took these warnings to heart, and there was no need to resort to these penalties.

Artifact 3: Cell Organelle DTP-Arc of Questioning

Read through the selection aloud.
Identify the job of each organelle.

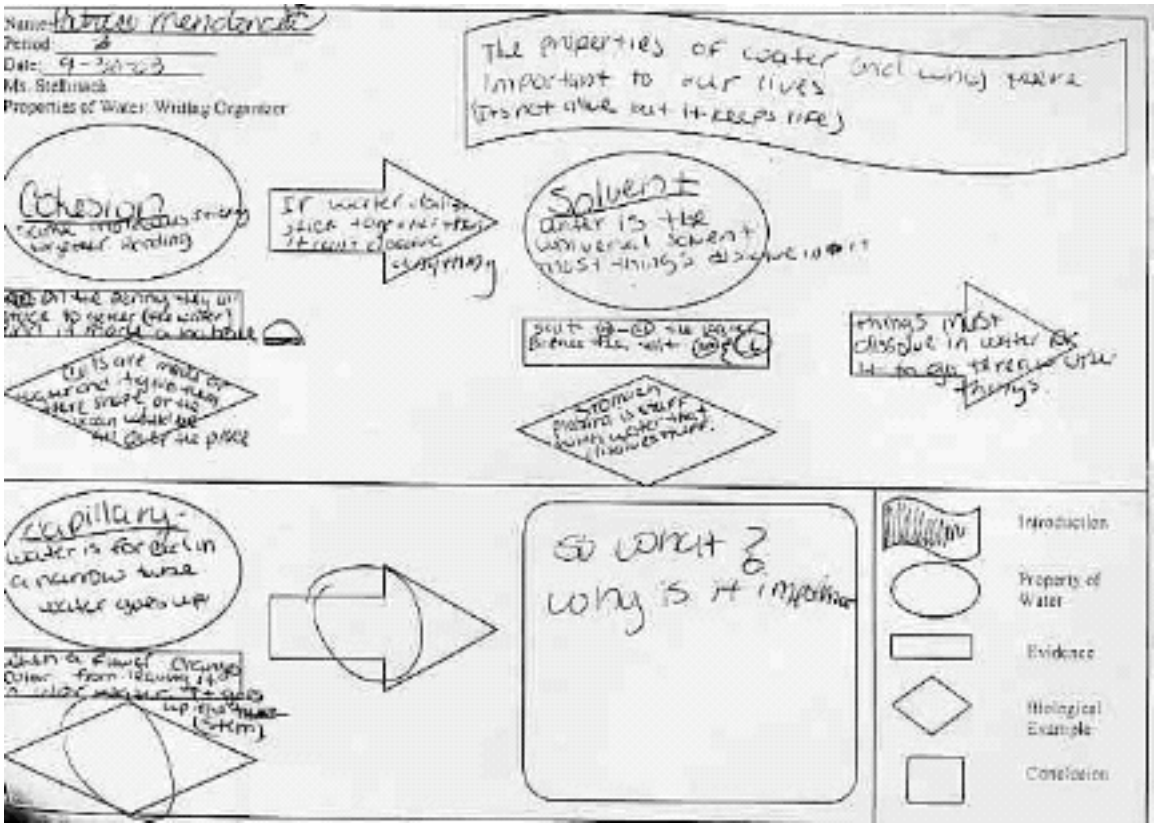
Pose questions:

- What is the job of this organelle?
- What would happen to the cell if the organelle was not present?
- What would happen to a plant if its cells lacked this organelle?
- What would happen to our bodies if our cells didn't have this organelle?

Reflection on Artifact 3:

Artifact 3 is an excerpt from a lesson plan. This section describes the pre-scripted questions to correspond with the current topic. These questions were valuable to me because they reminded me to delve deeper when prompting my students. Also, students found that these questions helped to better connect the material to their own lives. This arc of questioning progressed from the very small (cell organelle) all the way up to the whole organism (people or plants) and thus allowed students to understand the magnitude of this little organelle's importance.

Artifact 4: Writing Organizer



Reflection on Artifact 4:

Writing organizers served as a predominate writing tool in my class. When we first introduced writing organizers, we started with a simple version, consisting only of main ideas and details. Students quickly became very familiar with this method as a form of outlining. The above artifact represents one of our more advanced writing organizers.

In this assignment, students were asked to assess the importance of water to life, using textual and experimental evidence to support their beliefs. The writing organizer provides a template for the essay, while still maintaining the opportunity for originality and creativity. This organizer ensures that the student has all of the necessary elements, including and introduction and a conclusion, as well as connections between paragraphs. The student, however, is not restricted by these blocks because (s)he can expand upon these ideas however (s)he sees fit in the written version of the assignment.

Standard 5: Assessment

Reflection on the standard:

- Employ evaluations that are not graded but are used for comprehension checks and student feedback. How often is this done?

This semester we have had approximately 4 "Quick Quizzes". Quick Quizzes are given in the form of an entrance ticket but they are passed in, rather than recorded in the notebooks. Quick Quizzes usually ask for a summary or clarification of a point from the previous class. On occasion, they solicit feedback from the students on the quality/value of an activity or they seek out any questions that may still exist in the class. They are graded in class work points and scored only for completion.

After completing a reading on The Characteristics of Life, compiling a class list entitled "What do all living things have in common?" and trying to dispel preconceptions (such as "all living things move") and quick quiz was given asking students to write down as many characteristics of life as they could remember. Unfortunately, this quiz demonstrated that many students were still holding on to their previous notions of what it means to be alive. Student responses included the following statements: "All living things need oxygen", "Water is alive", and "All living things eat food" (which differed from the in-class definition for using energy).

While the results of this quiz were a bit disappointing, it served as a valuable tool in adapting the flow of the course. This activity served as an example of the difficulty of eliminating students' preconceptions. It also acted as an informal method of checking the progress of all of the students. During class time, the students who are understanding the material take every opportunity to demonstrate what they know, but Quick Quizzes allow the less vocal students to communicate their understanding (or lack thereof) without the high stakes atmosphere of a graded test.

- Provide opportunities for self-assessment.

At the end of the first half of the quarter, students were asked to fill out self-evaluation forms (Artifact 1). They were to rank their own performance on a scale of 1 to 6 in a variety of areas, including homework, class work, effort, and laboratory practice. There was also space allocated for student comments on each section. Students needed to complete this assessment before viewing their "calculated grades". We also spent some time reviewing how grades would be calculated (homework 20%, class work 50%, tests 30%) and how the point system works (ex: 27/50=54%). The importance of participation (being in class, prepared, and working can only help you) was also covered.

Once students had reviewed these topics, their mini-progress reports were distributed. Students were asked to compare their original self-evaluation to the calculated grades. Journal entries wee completed reflecting on any differences or similarities that may have

existed. Students were also asked to identify one specific area for personal improvement. I found this activity to be valuable in identifying the breakdown of these grades and the source of any potential problems. Spending class time on this topic prevented (or at least reduced) the problem of angry or confused students and the placement of blame for poor grades. Examining grades at a non-vital time early in the quarter took much of the pressure off students and allowed them to objectively examine their progress.

As we near the end of the quarter, I would like to revisit these original assessments to see if students feel that they have improved in any way. I would also like to remind students where their grades are coming from. They should always be aware of how they can do well and how they can improve.

- Use grades in the classroom? To what extent are they used as a motivator?

The grading system in my classroom (as specified by the cooperating teacher) is a combination of a point system and percentages. All work is divided up into "class work" (Artifact 2), "home work", and "tests and projects" and points are assigned as part out of a whole for each assignment. Then, the total percentage for class work counts as 50% of the grade, homework is 20% and tests/projects are 30%. At the end of each quarter, these overall percentages are converted into letter grades, based on the district's grading policy. These grades will appear on the students' report cards which are sent home.

Both students and parents were made aware of this system at the beginning of the year, and students are constantly reminded of it.

Grades on individual assignments tend not to motivate students. My group of students was more heavily influenced by the nature of the assignment (i.e. Is this an exciting project? Will I have fun doing this?).

- Exhibit a varied repertoire of evaluation methods? How does the student teacher decide which method to use?

In addition to grades and points, students almost always receive written comments as feedback to work that has been turned in (Artifact 3). These comments can serve a variety of purposes. Sometimes, and as seen in artifact 3, the comments relate directly to the piece of work that was turned in. Other times, and this occurs more often, the comments are more general notes to the student, either about their academic performance or participation. For instance, a student who makes an interesting comment in class, or behaves exceptionally well in class may find these comments on returned written work.

While tests have been a predominant method of evaluation in class, the types of tests presented have evolved quite a bit over the course of the semester. In addition to more traditional tests, students have also been confronted with more real word applications (see also Standard 2 artifact 1). One of the most recent tests asked students to read a case

study and answer the following questions (Artifact 4). Surprisingly, this method of assessment proved very effective in the classroom.

Artifact 1: Progress report Self Assessment

Name:_____
Period: _____

How am I doing in Biology class?

As we get closer to progress report time, I have been figuring out everyone's grade so far. Before I give you these grades, I would like to know how you think you are doing in my class. Please fill out this sheet as honestly as possible. Your answers will NOT change your grade. I just want to see what you think.

Remember, we have had two tests, one paper, two labs, several homework assignments, and a whole bunch of class work so far.

For each section, please circle the number that best described your work. 1 is the worst, "Needs Improvement" and 6 is the best, "Perfect".

Homework: How often do you do your homework? Is it always complete?

1 2 3 4 5 6

Comments:
_____
_____
_____
_____

Class work: Do you participate in class activity and take careful notes? When you are absent, do you see me to make up your work?

1 2 3 4 5 6

Comments:
_____
_____
_____
_____

Tests: Do you study when you need to? How have you been doing on tests? Are they easy or hard?

1 2 3 4 5 6

Comments:

_____
_____
_____
_____

Effort: How hard have you been working?

1 2 3 4 5 6
(not very hard) (working my butt off)

In Biology class I am doing (circle one):

- About the same as my other classes/About the same as I normally do
- Better than in my other classes/Better than I normally do
- Worse than my other classes/Worse than I normally do

If you had to give your self a grade (letter and number) what would it be?

_____

Reflection on Artifact 1:

This exercise in self-assessment gave the students an opportunity to reflect on their work thus far, but it also allowed me some insight as to their perception of their work. I was pleased to find that most students had a pretty good idea of what work they had completed. Those who seldom turned in homework were aware of it. The discrepancy, however, lied in the impact that these behaviors have on one's grade. Many students would readily admit that they rarely completed assignments and chose not to do their homework, but still thought that they should be getting a "B" in the class.

This activity prompted many discussion about where grades come from and what is determined to be acceptable behavior. Students were reminded to be on time and prepared, and more frequent "supply checks" were implemented, assigning points for covered books and pencils. This seemed to motivate students while in class, but homework remains a problem.

Artifact 2: Grade Book Sample

Classwork	1	2	3	4	5	6	7	8	9	10	11	12	13	Total Points Earned	%
Bass, Scott	20	7	10	0	10	10	10	10	0	15	15	0	0	107	**40**
Betances, Chayanne	15	0	25	0	10	13	10	10	0	0	15	40	0	138	**51**
Caba, Davie	0	7	26	0	9	20	10	10	0	0	0	37	35	154	**57**
Collis, Krystal	34	8	25	28	10	0	10	10	15	30	0	35	0	205	**76**
Delgado, Samantha	40	9	0	0	10	22	10	10	15	15	15	0	35	181	**67**
Diaz, Rafael	0	5	12	0	0	0	10	10	0	0	0	0	0	37	**14**
Dixon-Smith, Shyeece	0	0	0	0	10	11	10	10	0	0	15	0	35	91	**34**
Fernandez, Otto	20	3	15	0	9	0	10	10	15	0	10	0	35	127	**47**
Genao, Joesph	0	0	0	0	0	20	0	0	25	0	0	40	0	85	**31**
Lescault, William	27	9	25	0	9	11	10	10	0	20	15	0	20	156	**58**
Mercado, Victor	0	5	0	0	10	0	10	10	25	20	15	0	30	125	**46**
Morales, Josue	0	0	0	0	10	0	0	0	25	0	15	0	0	50	**19**
Neth, Veasna	35	7	10	0	10	20	10	10	0	0	10	32	0	144	**53**
Pacheco, Carlos	32	0	25	28	10	12	10	10	25	25	0	37	35	249	**92**
Patterson, Jamal	0	8	0	25	0	0	10	10	0	0	0	0	25	78	**29**
Quezada, Jennill	40	#	26	0	10	25	10	10	25	0	15	40	0	211	**78**
Ramos, Maria	40	9	5	30	0	25	10	10	25	0	10	0	25	189	**70**
Redondo, Arlene	20	#	5	29	10	24	10	10	25	0	15	0	0	158	**59**
Rezendes, Michael	0	5	0	0	10	10	10	10	15	20	0	0	25	105	**39**
Rivera, John	20	7	15	0	9	10	0	0	0	0	10	0	25	96	**36**
Robillard, Carine	40	0	0	0	10	0	0	10	25	0	15	0	0	100	**37**
Russell, Shawn	0	7	25	0	9	0	10	10	15	20	0	0	0	96	**36**
Sarno, Noah	0	0	0	0	9	11	10	10	15	20	15	0	0	90	**33**
Tavarez, Carlos	0	8	20	0	9	0	10	10	25	0	15	35	35	167	**62**

1-11/10/03 Plant and Animal Cell Lab, 40 pts
2- 11/4/03 KWL Cell Worksheet, 10 pts
3- 11/7/03 Sub Work- Cells Packet, 30 pts
4- 11/7/03 Making Microscope Drawings, 30 pts
5- 11/13/03 Top 10 Organelle Facts- Group work, 10 pts
6- 11/19/03 Muscle Reading Organizer, 25 pts
7- 11/25/03 Quick Quiz Part 1, 10 pts
8- 11/25/03 Quick Quiz Part 2, 10 pts
9- 11/24/03 Arm Model Activity, 25 pts
10- 11/20/03 Muscle Slides Lab, 30 pts
11- 12/1/03 Exercise Reading Guide, 15 points
12- 11/26/03 Chicken Wing Lab, 40 pts
13- 12/03/03 Disease/Injury Brochure, 25 pts

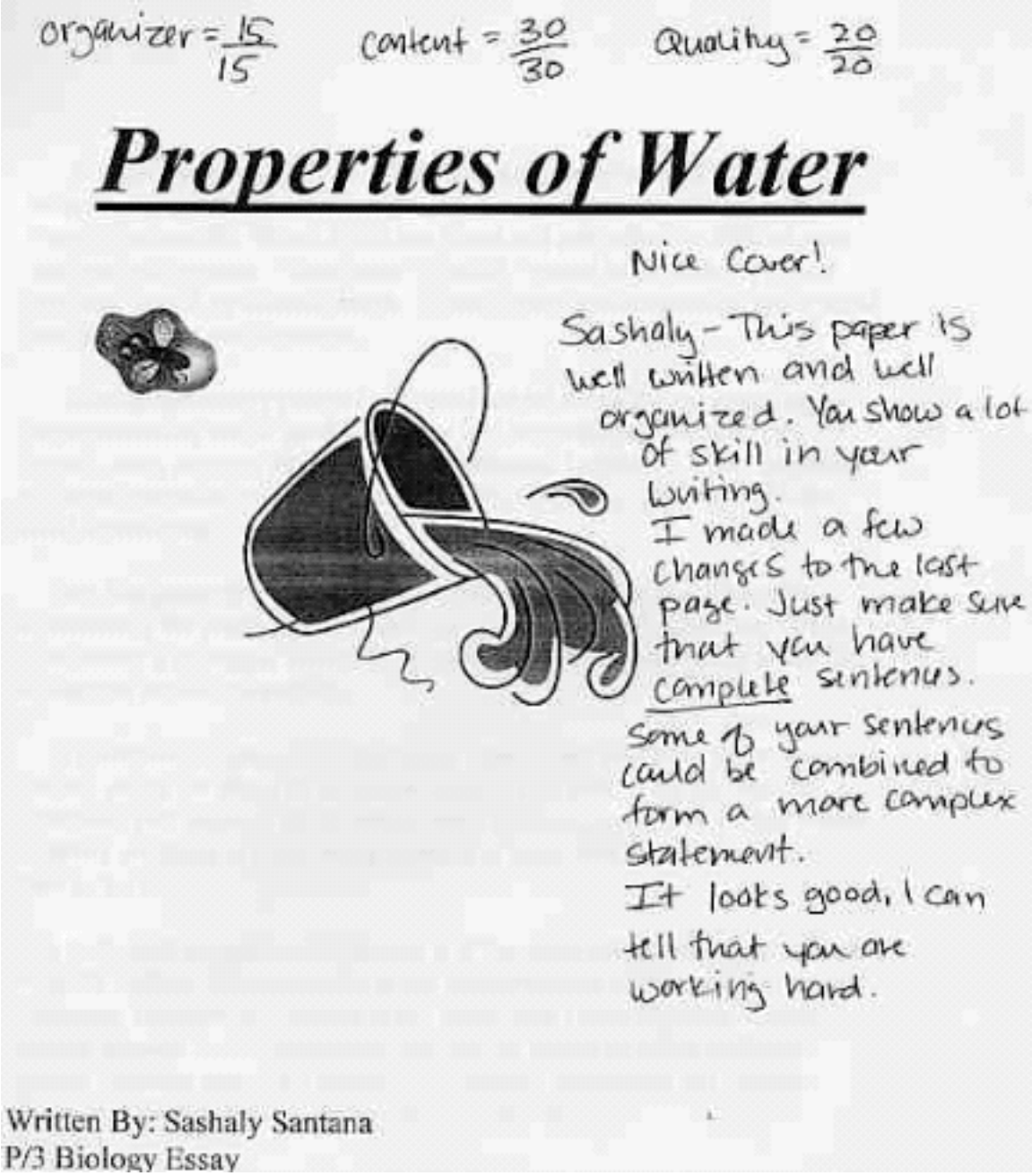
Total Possible Points = 270

Reflection on Artifact 2:

Artifact 2 is an excerpt from the class work section of my grading program. This artifact depicts many things about the use of grades in the classroom. It is seen that almost every school day has presented the opportunity for at least a few class worm points. This can mean two things. First, students have plenty of opportunities to gain points. Second, when a student misses a day of school, (s)he always misses something.

Also, the grade book shows that while assignments have a distribution of point values (from 10 to 40), no one assignment will make or break a students' grade. Class work is not meant to be high stakes.

Artifact 3: Comments on written work



Reflection on Artifact 3:

Artifact 3 is an example of written feedback on an assignment. (see Standard 4

Artifact 4 for more on this assignment). This essay was not only one of the most well written and well organized in the class, it as from a student who does not usually participate verbally in class. I hoped that the written feedback would provide an indirect link to show the student that her hard work was appreciated, and that it had paid off.

Artifact 4: Case-Study Assessment

Name:_____
Date:_____
Period:_____

Test: Muscles and Bones

Directions: Your test is based on the following case study. Please read the case study carefully and answer the questions that follow it. You may use your index card review sheet to help you. As always, please do your best work. Good Luck!
100 pts total, 10 pts each

Andre is a basketball player at Mount Pleasant High School. He has been playing ball at Mount Pleasant for the past three years. Andre is known for his good aim and his quick speed. He is often able to run from one end of the court to the other in only a few seconds, the fastest time on the team.

During last weekend's game, Andre was coming out of the game because he gets tired often. On his way off the court he tripped and fell. He landed on his arm. After going to the hospital, Andre's doctor told him that he had broken the bone between his shoulder and his elbow. His arm was put in a cast for six weeks.

For six long weeks, Andre was unable to play sports. He became very bored and was excited to get back to his team. When the six weeks had passed, Andre returned to the hospital to have his cast removed. The doctor used a saw to remove his cast, allowing his healed arm to be free.

Much to Andre's surprise, his arm looked much different than it used to. Andre's arm was very skinny and had shriveled up from being in the cast for so long. When Andre tried to play basketball again, he had a difficult time making his shots. He even missed his free throws, something the old Andre would never do.

Andre began to feel very frustrated. He could no longer play the sport he loved, and he was even having trouble carrying his heavy biology book up to the third floor for class. His arm was always tired, and carrying heavy things made it burn. The other students began to make fun of Andre for his skinny arm.

Andre was very upset with his doctor for making his arm shrink. He decided that it was time to do something about it….

Here's where you come in. Andre decided that he needed to see another doctor to get a second opinion, or another person's view of the situation. YOU are Andre's new doctor. Andre has a lot of questions for you. Please answer the following questions to help Andre better understand what happened to him. Use the information from this story to help you.

1. What is the name of the bone that Andre broke?
   A. Femur
   B. Radius
   C. Ulna
   D. Humerus

2. Andre wants to know what this bone looks like. Please draw a diagram of the bones in Andre's arm; labeling the bone that was broken. This is what Andre's X-ray would have looked like.

3. Andre is very upset with his doctor. He thinks that the cast the doctor used was defective and that it made his arm shrivel up. Please explain to Andre the REAL reason why his arm muscle became weak.

_____
_____

_____
_____

_____
_____

_____
_____

_____
_____

4. What type of muscle was weakened by the cast?

A. Cardiac Muscle
B. Skeletal Muscle
C. Smooth Muscle
D. Brain Tissue

5. Andre is concerned because his arm burns when he carries heavy items. He thinks that his arm may still be broken. Please explain to Andre the REAL reason why his arm muscles are burning.

_____
_____

_____
_____

_____
_____

_____
_____

6. Andre would like to rebuild his muscle to make it big again. Which of the following describes the best way for Andre to do this?

A. Attend aerobics class five days a week to increase his heart rate as much as possible
B. Lift weights every other day, making his muscles work to at least 75% of their maximum effort
C. Eat foods high in fat to gain back some of the weight
D. There is no way for Andre to rebuild his muscle; he should find an easier sport.

7. What are the names for the two main muscle groups that Andre is trying to rebuild?

_____
_____

_____
_____

8. Based on Andre's athletic performance, which type of muscle fiber do you think makes up the MAJORITY of Andre's muscles?

A. Slow Oxidative
B. Fast Oxidative
C. Slow Glycolytic
D. Slow Twitch

9. Why?

_____
_____

_____
_____

_____
_____

_____
_____

_____
_____

10. Andre is feeling frustrated with Basketball right now. He is interested in trying another sport. Based on your answers in number 8 and 9, which sport would you suggest Andre try? Why?

_____
_____

_____
_____

_____
_____

_____
_____

Bonus Question: (For Extra Credit)

Draw a picture (or a few pictures) showing how muscles contract. The more detail and

accuracy you show, the more points you will be awarded, for a possible 10 points extra credit.

Reflection on Artifact 4:

This test represents an effort to find an alternative way for my students to take a test. In the past, they had struggled with traditional "end of chapter" tests. They are often distracted by the complicated choices, or they are unable to understand the questions. (see Standard 6 Artifact 2 for more on literacy). This case study tested the same material that any traditional test would, only it did so in a different manner. For this test, students were asked to approach the problem differently. In essence, they were not taking a test, they were using their knowledge to problem solve to benefit a friend. Students responded well to this format. They were engaged with the story and performed very well, demonstrating a great deal of understanding.

Standard 6: Professional Knowledge and Growth

- Professional Journals and Publications:

I have found many interesting activities, techniques and labs in several professional journals. While many of these ideas are interesting and relevant, I have found that most are prepared for a general audience. In order to make them applicable to my situation, I need to make the appropriate changes. I have found that professional journals are most helpful when I use them as a springboard for activities and lessons that can more directly interest and involve my students. I suppose this is the real purpose of these publications, and making these adaptations will require time and experience, in addition to a better understanding of my students, their abilities, and limits.

During our unit on enzyme activity, I planned to use a modified version of a lab entitled "Supermarket Proteases" (Artifact 1). I found the original version of this lab in the most recent (October 2003) issue of The Science Teacher. This lab takes the somewhat intangible topic of enzyme reactions and implements the same ideas using materials that are more commonplace. Students can track the rate of enzyme digestion of gelatin proteins by monitoring the color change of the "Jell-O". Students can compare the reactivity rate that different materials have on the protein, including contact lens cleaner and meat tenderizer. This lab is designed to demonstrate that enzymes are more present than most students would originally think.

The lab allows for many different activities to be derived from its basic plan. It includes direction to monitor the effect of temperature and pH and also shows different ways to track the color change (spectrometer or eyeballing the color's "intensity" over time). At this point, I think that I will have my students look at the effect of different substances

and heat on the deepness of the color. We have not covered pH in depth, and I think that explaining the workings of a spectrometer may take more time than is necessary. I wanted the students to gain an understanding of enzymes, their roles, and their presence without further complicating the matter. Unfortunately, due to time constraints, this lab was never added into the curriculum, but I plan to keep it on hand for next year.

- Professional Growth:

My current Personal Inquiry Project (Artifact 2) can be used as a tool to increase my effectiveness as a teacher and to boost my students' comprehension skills. I plan to explore the following question: How can the use and importance of interpreting graphics* be integrated into the science classroom? (*Possible graphics includes the following: diagrams, charts, graphs, pictures, etc). Throughout the duration of the project, I will have students take reading comprehension quick quizzes. The point system will be used to compare scores at all points in the project. Do students demonstrate a greater amount or degree of understanding after the introduction of visuals? Are the students able to carry their knowledge over from the visuals and incorporate it with the reading?

> The topic for this project was prompted by careful examination of my students' literacy weaknesses. Often, students with difficulty reading and writing find it challenging to express their ideas in writing. The introduction of graphics into the classroom curriculum will provide a new vehicle for students to demonstrate their understanding. While literacy remains to be a challenge in all classrooms, graphics will provide all science students, especially those who are special education and ESL, with a visual way to comprehend and explain material. Also, the use of diagrams and charts encourages interpretation and observation for all students.

Many times, my students do not have the language skills to express an idea. They do, however, have some sense of what they are trying to say. I have found that these students are usually more than happy to "draw me a picture" to explain themselves. I hope to provide a structured way to visually represent understanding so that students are able to apply what they have learned. While drawing and graphing will not (and should not) replace reading and writing, it may ease the struggle for many of my students.

- Reflect thoughtfully on the student teaching experience?

Writing my mid-semester self evaluation proved to be a valuable tool in not only reflecting on my experience thus far into the semester, but it also provided some degree of perspective on what I had already accomplished. Also, the self assessment provided the opportunity to set standard-specific goals for the remaining weeks. These goals proved valuable in the compilation of the final portfolio.

Artifact 1: Supermarket Proteases Lab (excerpt)- Professional Literature

Background on enzymes

Enzymes are specific in their actions and react with one particular substrate. The active site of an enzyme is where substrate binds and chemical reactions occur. Proteases are enzymes with the specific ability to break up proteins into smaller polypeptides by hydrolysis. Major digestive proteases in humans are pepsin, trypsin, and chymotrypsin. Pepsin is found in the stomach of animals and helps begin the digestion of meat, fish, cheese, and other ingested proteins. Other digestive proteases are found in the small intestines, including trypsin and chymotrypsin. Digestion of ingested proteins in our stomach and small intestines releases individual amino acids to the blood stream for other metabolic processes including synthesis of our required proteins.

Proteases digest various proteins in all organisms including plants. Plant proteases of particular interest are found in tropical plants such as papaya and pineapple. Pineapple fruit and its stalk provide another plant protease called bromelain. Other proteases, or endopeptidases, are chlostripain, subtilisin, thermolysin, plasmin, elastase, and thrombin.

Proteases are used commercially in some soaps and detergents to dissolve protein stains such as grass and bloodstains. They also are used as the principle ingredient in meat tenderizers to predigest some of the proteins (sliced fresh pineapple may also be used as a tenderizer). Commercial proteases are often in the form of freeze-dried powder. In this form, the enzyme is kept stable until it is activated by water. The most abundant commercially produced protease is papain extracted from papaya plants. Papain is used in most meat tenderizers and in some contact lens cleaners. Many different brands of contact lens cleaners include a number of the proteases listed above. The cleaning solutions have an active protease to digest proteins that attach to contact lenses.

A popular protein

Gelatin is an important protein nutrient that can be broken down by the proteases described in the previous section. Because of its unique properties, gelatin is widely used in the food industry as a dessert and is used to thicken, emulsify, and bind products. Gelatin is extracted from dead animal skins and bones as collagenous material, which is then treated to produce the final gelatin. This cholesterol-free protein has a unique sequence of amino acids; gelatin's high content of the amino acids glycine, proline, and hydroxyproline frequently bind to form a

FIGURE 1

Absorption spectrum for different gelatin colors.

The absorption spectrum of the pigments added to gelatin to give it color (absorption maximum was normalized at the peak for better comparison).

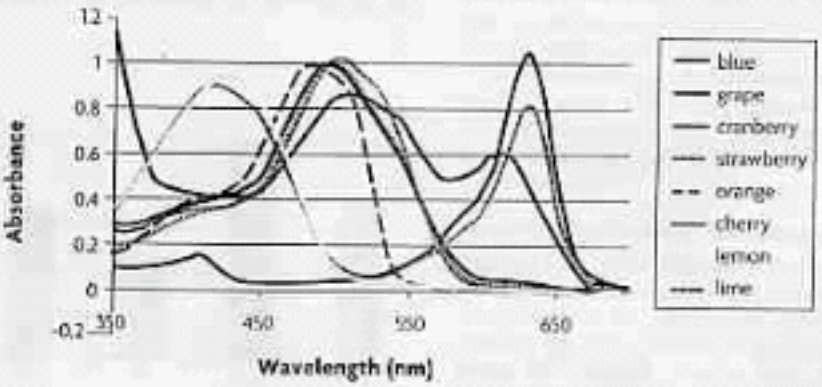
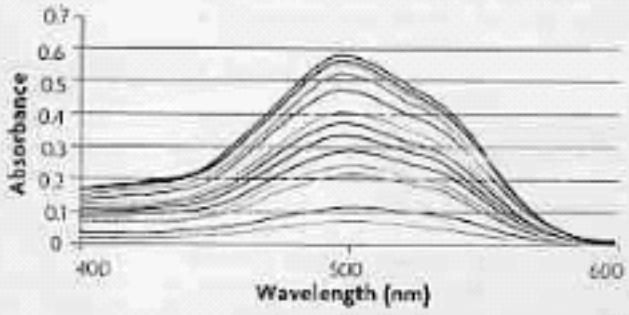


FIGURE 2

Protease release of cranberry gelatin.

Absorption spectrum of pigment released from protease digestion of cranberry gelatin. (This was the first experiment conducted and a protocol for the measurements in the activities discussed within the article.) A sample of 0.33 g of gelatin was covered with 4 mL of contact lens cleaner (1 tablet/5 mL) and the absorption spectrum was measured automatically every 3 minutes. The gelatin digestion by protease causes the release of the red pigment and increases the measured absorption spectrum with time.



Safety note.

While this lab contains no special safety concerns, it is always important to follow the standard lab safety precautions. Though gelatin is perfectly safe, no food should ever be eaten in a laboratory. Goggles should be worn at all times because glassware is in use, and a few of the materials (e.g., meat tenderizer and lens cleaner) could be eye irritants. This is a relatively safe laboratory with the hot water as the main hazard used to dissolve the gelatin.

gelatin pieces until equilibrium is reached (this might be due to differences in tonicity). The breakdown by proteases continues until there is no solid piece of gelatin left in the tube or beaker. The water controls still will have solid material a few days later. It is always good to check the absorption spectrum of released pigments to make sure there is no change in absorption spectrum with pH.

Assessing understanding

From this laboratory, students should learn that enzymes decrease the energy of activation of chemical reactions and make them happen immediately instead of years down the road. Students should also learn that enzymes specifically interact with one substrate, and are sensitive to pH, temperature, and other factors. Some students will be able to clearly state these concepts, plot the data from the experiments in a clear fashion with proper labels, analyze the relationship between variables and trends, and be able to predict some future application of this system to real life situations.

The following questions may help generate discussion during the lab and will help the teacher assess student understanding:

- Plot the absorption readings at 500 nm versus time for the five samples. Is the release of pigment from the gelatin the same in all of the samples? If not, please explain what might have caused any differences.
- On a separate graph, plot a bar graph using the final values of pigment absorption (end of experiment reading minus the first reading) from each sample with respect to method used.
- Discuss your experimental results in terms of the protease samples used and their breakdown of the gelatin protein. Don't forget that enzymes are very specific toward their substrate, and certain proteases might not be as effective with gelatin as a substrate as they would be with other proteins. How can this experimental protocol be used to measure both the quality and quantity of protease in some of our samples?

Discussion

Although the measurement of liberated pigment using a spectrophotometer provides a solid quantitative method for measuring protease activity, other visual methods may be used for a semiquantitative method. An example is the use of a color chart or test tubes with different dilutions of the flavored gelatin solution (not solid). Students could grade each sample with a value from 0 to 5 after comparing the color of liberated pigment with the standard (where 5 is the release of all pigments and 0 is the release of no pigments).

This experiment offers students an interesting method to test various proteases found in drug stores and supermarkets, and a relatively easy and quantitative way to rate the proteases in terms of their ability to digest the gelatin protein found in desserts. We have used it as the first laboratory in introductory courses for students with great success. Students seem to take extra satisfaction in comparing store brands of proteases in terms of their cost and enzymatic activity. Most importantly, students gain a strong understanding that biologically speaking, enzymes "make the world go around." ■

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Butterwell, L.D., V. Rannig, and W.G. Hagar. 1998. Investigating a bioengineered enzyme. *The Science Teacher* 65(1): 27–29.

Butterwell, L.D., and W.G. Hagar. 2005. Digesting complex carbohydrates. *The Science Teacher* 70(2): 41–43.

Hagar, W.G., and L.D. Butterwell. 1998. Enzyme electrophoresis. *The Science Teacher* 65(1): 41–43.

Rannig, V., L.D. Butterwell, and W.G. Hagar. 1994. Enzymes and the what and how of digestion. *Science Scope* 5(17): 17–18.

On the Web

For additional enzyme labs using gelatin, visit *www.nsta.org/highschool*.

Reflection on Artifact 1:

While, unfortunately, I was never able to use this lab in class, being exposed to publications of high school lab activities has been valuable. Originally, I intended to use a modified version of this lab for a unit on enzymes. When I first came across the lab, I was excited to see that it corresponded perfectly with what we were about to cover. I was disappointed, however, with the fact that we did not have the materials necessary to complete the lab as it was describe din the magazine. With some planning, I managed to employ the same principles and ingredients while making the lab more compatible with our classroom and with the students.

This lab also inspired me to design the inquiry lab, a lab based on food products. The explanation of this lab showed me both the importance of connecting more abstract ideas directly to the students, as well as the ever-present nature of food. In the end, my students enjoyed experimenting on food, even though it was done in a different setting.

Artifact 2: Personal Inquiry Project Annotated Bibliography

Chavkin, L. 1997. Readability and Reading Ease Revisited: State-Adopted Science Textbooks. *Clearinghouse.* 70, 3: 151-155

Chavkin utilizes two methods, the Fry Readability Graph and the Flesch Reading Ease formula, to determine the readability of a range of science textbooks used in the state of Texas between 1994 and 1997. Conclusions indicate that the majority of the books, with chemistry being the "worst offender" were written for college level students and beyond, yet were marketed and distributed to high school students. Chavkin urges schools and administrators to take their students' needs into account when selecting a textbook, stating that matching the student to the text will improve the books' effectiveness.

Duran, BJ, Dugan, T and Weffer, R. 1998. Language Minority Students in High School: The Role of Language in Learning Biology Concepts. *Science Education.* 82: 311-341.

Duran et. al. draws from the work of Vygotsky. This group has tested a variety of methods in an attempt to allow English language learners to construct meaning from cumbersome biology vocabulary. It was found that students in this position tend to repeat language directly from teachers and the text, in the hopes of generating a correct answer. This study implemented the use of diagrams to allow students to use their own words and interpretations of concepts. Students were also trained to use semiotic clues imbedded in the text to find meaning in the abstract or complicated terms and descriptions.

Friel, SN, Curcio, FR, and Bright GW. 2001. Making Sense of Graphs: Critical Factors

Influencing Comprehension and Instructional Implications. *Journal for Research in Mathematics Education.* 32, 2: 124-158.

Friel et. al. points out that, while all graphs share major components, interpretation is often difficult because each individual graph is unique to its context and its purpose. Graph readers are able to manipulate data in a number of ways. On the most basic level, they are able to extract data from a graph. Intermediate students can identify relationships between data sets. Those most adept at graph interpretation will be able to draw greater conclusions beyond the data presented. Ultimately, producing a clear, concise, and relevant graph is much more complex than conventionally thought.

Hadaway, NL, Vardell, SM, and Young, TA. 2002. Linking Science and Literature for ESL Students. *Book Links.* Oct/Nov: 31-36.

Hadaway et. al. addresses the problem of technical vocabulary specific to science textbooks and the struggles ESL students often face. This article suggests overcoming the vocabulary burden by supplementing textbook reading with nonfiction, fiction, and even poetry selections. Hadaway also emphasizes the need for explicit and relevant graphics, as well as simple, clear language in any educational text.

Henderson, G. 1999. Learning with Diagrams. *Australian Teachers Journal.* 45, 2: 17-26.

Henderson documents several instances of the implementation of diagrams in the classroom. Descriptions of various types of diagrams are included. (Graphs, charts, picture, flow charts, Venn diagrams, etc.) Henderson notes that the fatal flaw of these diagrams is often assumption on the part of the teachers, as many students are unfamiliar with the skills necessary for accurate interpretation. While Henderson supports the dual coding theory, suggesting that diagrams combined with text provide the greatest opportunity for understanding, the drawbacks of diagrams as scientific representation are also discussed.

Hubisz. J. 2003. Middle-School Texts Don't Make the Grade. *Physics Today.* May: 50-54.

Funded by a grant from the American Association of Physics Teacher, Hubisz examines some of the most common errors found in a variety of middle school physical science textbook. Not only are many of these publications full of scientific errors and grammatical mistakes, the information is often inaccessible to its readers. Hubisz found that textbooks often distract readers with colorful images many of which do not demonstrate meaning to the 11-14 year olds reading the text.

Lovitt, T and Horton, SV. 1994. Strategies for Adapting Science Textbooks for Youth

with Learning Disabilities. *Remedial and Special Education.* 15, 2: 105-117.

Research presented by Lovitt and Horton addresses the fact that many students, including those without documented disabilities, struggle with textbook reading. While eliminating textbooks may not be an efficient or effective solution, there are many ways for teachers to modify the manner in which the text is presented. Lovitt and Horton promote the use of vocabulary drills, study guides, and graphic organizers. Methods aside, the realization that textbooks are unable to meet the needs of all students is a valuable one.

Moore, JE. 2003. The Art of Sorting. *Science Activities.* 39, 4: 17-21.

This article provides the framework necessary to implement a 3-D Venn diagram activity in the classroom. More importantly, the background information provided by Moore highlights the role of scientific thinking in cognitive development. Moore supports the idea that creating Venn diagrams allows students to use a more tangible manipulative, thus creating a visual image depicting the pertinent information.

Ozgun-Koca, SA. 2001. The Graphing Skills of Students in Mathematics and Science Education. *Clearinghouse for Science, Mathematics, and Environmental Education.*

While this study is intended to strongly support the move to include technology based graphing systems in the classroom, significant attention is also directed to the need for cross-curricular applications of graphing skills. Ozgun-Koca points out that many students only demonstrate a superficial knowledge of graphical understanding because the skill is rarely utilized outside of the mathematics classroom. The article suggests more meaningful applications of graphing in science disciplines to encourage enduring and authentic understanding.

Parmar, RS and Deluca, CB. 1994. Investigations into the Relationship Between Science and Language Abilities of Students with Mild Disabilities. *Remedial and Special Education.* 15, 2: 117-127.

Parmar and Deluca indicate that, of all students placed in inclusion classrooms, almost all receive inclusion/mainstream education in science. These students, in particular, tend to struggle with conventional vocabulary-laden science curricula. In this research, it was found that students identified to have "special needs" (although these needs were not defined) tended to read fictional stories at speeds about half as fast as those students not identified. When the reading material contained scientific language and information, speeds dropped to almost one third of their non-identified peers. It was found that special needs students performed significantly better in tests involving visual images. Parmar and Deluca conclude that alternative forms of assessment and communication are necessary, for inclusion students will not demonstrate their true level of understanding in

a language and text driven science classroom.

Pinto, R. and Ametller, J. 2002. Students' Difficulties in Reading Images. Comparing Results from four National Research Groups. *International Journal of Science Education.*24, 3: 333-341.

Pinto and Ametller track the progress of students in four countries, France, The United Kingdom, Spain, and Italy. All students were measured in their ability to interpret diagrams presented with written components in the students' native languages. It was found that, despite the educational popularity of diagrams embedded in text, many students lacked the conceptual knowledge necessary to interpret these visual clues. Often times, the textbook diagrams also lacked the appropriate elements necessary to correct interpretation. Pinto and Ametller recommend that proper diagram use be taught explicitly to students, as well as to pre-service teachers.

Roth, WM. 2002. Reading graphs: Contributions to an integrative concept of literacy. *Journal of Curriculum Studies.* 34, 1: 1-24.
Roth argues that an increasingly visual world, graphical interpretation is becoming a learned skill. Contrary to previous publications, the ability to interpret and create graphs does not depend on metal capacity. Instead, the semiotic components to the skill require additional understanding. Roth highlights the fact that an understanding of basic language is necessary before a reader is able to grasp a deeper understanding of the material presented. Further, Roth suggests that graphic analysis is an increasingly important element of cross-curricular literacy.

Stylianidou, F. 2002. Analysis of science textbook pictures about energy and pupils' readings of them. *International Journal of Science Education.* 24, 3: 257-283.

This study examines the reactions of students when presented with one of six different diagrams. All of the diagrams were obtained from popular and heavily visual science textbooks, and all diagrams dealt with the topic of energy. It was found that students often struggled with the complex nature of the diagrams, as well as the disconnect that existed between the use of actual pictures and symbols to represent objects. The authors of this study conclude that it is important that instructors do not trivialize the difficulties associated with interpreting such images.

Tyree, RB and Fiore TA. 1994. Instructional Materials for Diverse Learners. *Remedial and Special Education.* 15, 6: 363-378.

Tyree and Fiore investigate the reading levels at which conventional texts are written. It is reported that most texts, regardless of target age group, are written for above-average readers in that grouping. These books are usually only accessible to the top half of the class. Research also shows that sentence and paragraph structure is often

incomprehensible to students. Tyree and Fiore suggest that the most effective textbooks are those that have been previewed by a wide cross section of the community. Also, text should be clear, consistent, interesting, and illustrated.

Watson, SMR. and Houtz, LE. 2002. Teaching Science: Meeting the Academic Needs of Culturally and Linguistically Diverse Students. *Intervention in School and Clinic.* 37, 5: 267-278.

Watson and Houtz argue that students from different cultural and linguistic backgrounds face two distinct challenges in the science classroom; adapting to the academic culture and learning technical terminology. Teachers can assist students in overcoming these hurdles by providing clear expectations and a predictable schedule (to introduce students into an academic environment) as well as contextualize information. If material is presented as an extension of the students' personal experiences, concepts will be perceived as less of a burden, placing the focus away from vocabulary and back on content and skills.

Reflection on Artifact 2:

My personal inquiry project addressed the issue of literacy in the science classroom. Students' reading levels were assessed and compared to those at which the text books are typically written. It was found that one of the largest factors contributing to gaps in understanding was the difficulty of the reading. These sources contributed valuable information to my understanding of the problem, as well as some possible techniques to address the problem.

Working through this issue with my particular group of students reinforced the importance of varied assessment. I also found that authentic applications are often more valuable than traditional methods of assessment because, when used properly, they foster high level thinking and problem solving (see Standard 5 Artifact 4).

Artifact 3: Mid-Semester Self-Assessment

Kelly Stellmach
Mid-Semester Self-Assessment
October 20, 2003
Mount Pleasant High School Providence, RI

Standard 1: Roles and Relationships

A. <u>Relationships with Students</u>

- Organize resources, materials, and physical space allocated to support active engagement.

Each student in my classes has a composition book and folder designated solely for biology. These materials remain in hanging folder box in the classroom when they are not needed for homework assignments or at home studying. All of the students are in the routine of coming into class, gathering their materials, and setting up their notebook page for the day. Each day, students record the date, the topic question, and the agenda. This method has helped students to settle down before class begins and also encourages accurate record keeping.

Students are familiar with their assigned seats, but adapt readily when desks are moved into small groups, pairs, or when work needs to be completed at lab tables. The small size and permanent nature of lab tables made classroom set-up a challenge at first. Luckily, however, the students are cooperative and willing to work together to rearrange seats as necessary. We are now capable of arranging the room as needed, completing the day's activity, and (usually) returning the room to its original state, either through arrangement or clean up, by the end of the period, with minimal deviation from the day's objectives.

Many times, large numbers of students come to my classroom, both before and after school, as well as during lunch to ask questions, get extra help, or just work on homework. I have come to believe that these students are comfortable in my class and see the environment as a place where they are able to work. I do realize, however, that there are some students who do not feel this way. I would like to have increased contact with the students who have not actively sought out my attention.

- Make a consistent effort to understand each student's learning and cultural background as well as needs.

Almost all of my students come from a cultural background that is different from my own, and many of these backgrounds differ greatly among students as well. Additionally, my classes are composed of a wide range of ability grouping. Many times, I feel that I do not know where my students are coming from on many levels. In most cases, my students will speak up if they are unfamiliar with some portion of the material, if something is too difficult, if we are moving too quickly, or if they just don't understand something that I am talking about. I am pleased that my students are comfortable enough to voice these concerns in the classroom setting.

In order to cater to different learning needs and ability levels, I have tried to work different levels of challenge into various assignments. For example, I always conduct writing assignments in the same manner. Once the material has been presented in a variety of ways, the students are presented with a writing question. Their first task is to complete a graphic organizer for the assignment. These organizers are provided to each student, and the form is consistent across assignments. While this technique may be

primarily used for students with limited proficiency, I have found that all students benefit from the organization that it provides. Next, the students convert the organizer into paragraph form, forming the body of the essay. Once the content of the essay is explicitly spelled out, students add an introduction and a conclusion. This is the opportunity for more advanced students to extend their skills. A more talented writer or a student with a firm grasp on the material can contribute information or style above and beyond the standard.

I have found that this method provides every student with both the necessary support and the welcome freedom. It is important to me that every student be afforded this opportunity, regardless of specific need and free from stigma or stereotype. I believe that, just as every student benefits from organizational skills and prewriting, every student deserves the opportunity to experiment with the artistic and expressive side of writing. The combination of these techniques into one type of assignment demonstrates that every student has the tools necessary to achieve a "personal best" product.

A. Expectations of Students

- Make demands of students in the interest of their learning and their learning styles. Are there high expectations for all students? Are students expected to take responsibility for their own learning?

I try to make every effort to avoid assigning "busy work" to my students. As much as I want them to take their work seriously, I want all work to be serious work. In the past, I have justified the "why" behind assignments to myself, but I think that I may not have conveyed this clearly to the students. When they ask "Why are we doing this?", I am able to fully explain my reasoning, and usually find agreement but I think that this should be made clear from the onset. Students shouldn't need to ask "Why" in these situations, it should be clear from the beginning.

Recently, during a lab activity, all students were to record the directions for each station in their notebooks before completing the experiment. I chose this task because I wanted students to personally write out what was to be done before beginning. This lab involved some mildly hazardous chemicals, and I wanted to be sure that each student knew the safety precautions and expectations associated with the lab. I thought that the physical process of rewriting the directions would help to instill these ideas in the students.

During the lab, several students expressed that they were frustrated with this task and wanted to begin the lab right away. A few students said that I should have provided each one of them with a packet for them to write in. One student even mentioned that they probably had to do this because the copy machine was broken. After hearing these comments, I realized that while my expectations were clear, my reasoning could have been better expressed. Once I realized this, I called the class together to explain the above

reasoning. When I explained why we were doing this, and reminded the students that, in the past, they have had trouble following written directions they agreed that they were more likely to remember what they wrote. After this point, the remainder of the class went smoothly.

A. Relationships with Colleagues and the School Community

- Work with fellow teachers.

Daily observations have provided a vehicle for conversations with other teachers. By physically being in other classrooms everyday, I have had the opportunity to talk with many teachers about different issues.

The guidance counselor I observed also works as the Cross-Country coach. Coincidentally, I have many students who are running this season. During my observation time, I was able to discuss these students' progress, both in and out of the classroom. I learned that one of my students was recently tested for special needs and was found to have a very low reading level. We also discussed this student's strengths and goals for the school year. Another student was having some trouble with her family outside of school. I learned of this situation, and we discussed some techniques and strategies that could help this student to keep her focus on school.

Overall, I was able to obtain some very valuable information about many of my students. I was also able to develop a relationship with a colleague that has helped both my students and myself. Now I know that if I need a particular student to stay after school to make up work, the student cannot claim that she needs to go to practice. I know that the coach will support my call to have the student focus on academics first. Also, I am glad to know another faculty member who has close contact with these students. I feel that if I ever had a question about one of their behavior or performance I have another resource to discuss the issue at hand.

This experience has demonstrated the value of sharing information with other teachers. Many 9th graders at Mount Pleasant have been placed on teams to help them transition into a high school environment. After seeing the benefit that these conversations can have, I believe that every student could benefit, on some level, from being placed on a teaching team.

- Interact professionally, fairly, and equitably with students, colleagues, and parents.

On the first day of school, a letter was sent home to all students outlining the policies and expectations for the course. The bottom portion of this letter was signed by a parent or guardian and returned. With the exception of only a few students, everyone returned their

letters within the allotted time.

Half way through the quarter official progress reports were sent home by the school. Students were assessed as "S", satisfactory or "U", unsatisfactory. School policy states that all progress reports are to be signed by a parent or guardian and returned.

November 20th is parents' night. This is an opportunity for families to come to the school, pick up the student's report card for the first quarter, and meet with the teachers. It is my goal to make stronger connections with my students' families at this time. In order to encourage families to attend, I plan to mention the event in class for several days leading up to it. Also, I would like to send home reminder notices in an attempt to have parents attend the event and stop by their child's biology class.

Goals:

- Extend a positive classroom environment to include all students.
- Clearly explain reasoning behind assignments, activities, requests, etc.
- Enhance school-home connection specifically on parents' night.

Standard 2: Students as Learners

- Challenge learners to develop higher level cognitive skills.

Our most recent test was quite a challenge for most all of the students. This was because the test was not in traditional multiple choice/true false/short answer form. Instead, students were asked to use their writing skills to apply their knowledge to a new situation. We had spent several class periods examining the role that chemistry plays in the human body. Their unit evaluation was to use this knowledge combined with the data provided on a Gatorade bottle to answer the question, "Is this label scientifically accurate?"

At first, students were upset because, despite advice to focus on the human applications of our lessons, they chose to memorize the facts on their review sheet. I ended up allowing those students who completed a review sheet to use it during the test as a resource and a reward for completing the assignment. Once the students began working on their writing organizers, their ideas began to take shape. Many students produced coherent and accurate essays detailing their opinions of the product.

I plan to use this assessment technique in the future because it provided students with a more relevant application for their learning. Those who were successful were surprised with what they were able to understand, and most students ended up with more questions about Gatorade than they had when they started. With adequate feedback and

the opportunity to rewrite the essay, I think that my students can become better at the task of "application". I hope to extend this method so that all students understand how their learning is relevant and are provided with the opportunity to make such connections.

- Create learning groups in which students learn to work collaboratively and independently.

We recently completed a group work assignment designed to familiarize students with the different types of organic compounds (amino acids, proteins, and lipids). Other compounds were covered in various class activities. Each group was composed of four students, and each student was assigned a prescribed role. Roles were as follows: Recorder: responsible for writing out the questions and answers as dictated by the group. Artistic Director: responsible for coming up with a poster design and completing additional art work when necessary. All students were encouraged to draw some part of the poster. Chemist: responsible for ensuring that the correct chemical structure is accurately portrayed on the poster. Presenter: responsible for organizing and leading a 3-5 minute group presentation. Each student was responsible for fulfilling one of these specific roles, as well as contributing in some way to each part of the project.

The group work aspect of this project worked very well. The assigned student groups were effective and students seemed to enjoy working together and looking up information. Role assignment was also effective because it enabled students to take ownership of a certain aspect of their project. Students became very possessive of their roles and worked hard to ensure quality.

The presentation aspect of this project, however, was not as successful. During group work time it appeared that students were gaining a firm understanding of the material. Once they were to share their information, they struggled quite a bit. Student presentations were unclear and failed to demonstrate learning. At first I was confused as to why students were able to explain their knowledge on the individual level but could not share this with the class. After further probing, I found that many students were inexperienced when it came to class presentations. In order to reflect on this experience, I had students complete a journal entry listing "3 things they would do differently in their own presentation, 2 things they didn't understand about someone else's presentation, and 1 thing they like or disliked about this project". Not surprisingly, most students recognized that they needed to speak louder and be more organized. In the future, I will need to provide students with more detailed expectations and explain thoroughly what an excellent presentation will contain. Hopefully, next time students will combine this experience with clear expectations and the presentations will be more successful.

Goals:

- Provide continued opportunities for students to become accustomed to and adept at

using their scientific knowledge in "real world" situations.
- Clear expectations that are free from assumptions and above and beyond what I think would constitute a necessary explanation.

Standard 3: Planning

- Prepare a variety of learning activities chosen in order to accommodate different learning styles and a diverse group of students.

Up to this point, I have tried to vary assignments and techniques in order to make the information accessible to various types of learning styles. We often cover the same material over several days only it is presented differently. For example, we spend a unit learning about the properties of water. One of the main lessons here was for students to understand that, while water itself is not alive, it does support life. On the first day of this unit, the students took notes from a DTP connecting previous chemistry knowledge to water and its importance. Over the next couple of days, students completed independent readings and compared notes in pairs. There was also a lab activity that allowed students to witness and manipulate water under a variety of circumstances. This unit was finalized through an essay assignment asking students to discuss the above topic.

I chose to implement this variety with the intention of providing all students with the opportunity to do well. I have also mandated the various techniques in order to teach students that they will need to challenge themselves in some areas. In the future, I would like to occasionally allow students some choice in how they approach new material. Now that they have been exposed to all of these various methods, they should be able to determine which they like the most and which is the most beneficial. While constant choice may not push the students to overcome challenges, occasional choice, or the distribution of an element of choice may encourage students to take responsibility for their own learning.

- Use written plans. Are these an accurate guide to what actually happens in class?

I have been consistently and thoughtfully using the prescribed lesson plan template. I find this process to be helpful in working through the reasoning behind my lessons, as well as working out the logistics of such things as taking attendance and distribution of materials. In planning, I am always concerned that we will complete the lesson long before class is over, leaving students with nothing planned. As a result, I tend to over-plan, cramming too much into one day.

On one day in particular, I tried to complete three activities during first period. First, we did a complicated reading on carbohydrate structure. This was followed by an experiment documenting the break down of a saltine cracker from starch into sugar. Finally, we tried

to construct a model of a sucrose molecule out of gumdrops. This class (45 minutes long) was very rushed and, while the students were cooperative and went through the motions of the assignments, it was clear that they did not know why they were doing these things. In third period, I decided to break down the lesson, doing only the reading and the saltine cracker experiment in the first day. This set up allowed us much more time to reflect on the information and examine the lab more closely.

Initially, I addressed this problem by attempting to rush activities and move through the lesson plan. After doing this for a few days, I noticed that it was overwhelming for the students. Now, I write my lesson plans in the same way, but I am more open to the idea of extending an activity into the next day of class. Usually, I will plan a lesson for the day, knowing that some of the activities may be continued on the next day. I try to order my activities to allow for more flexibility in day-to-day planning. I believe that, in time, I will become a better judge of what expectations are reasonable in one class period.

Goals:

- Provide students with a greater element of choice in assignment selection.
- Refine objectives to meet the students' capabilities in a 45-minute class period.

Standard 4: Classroom Practice

Development of Student Skills

- Instruct about how to read with better comprehension, how to take effective notes, how to write clearly and coherently. Are the students given models or exemplars to guide their work?

With every new section of reading, we complete "spilt log" notes as a class. First, students read the section independently and underline any important ideas. If they come across a work that is new to them, they are to circle it and write what it means in the margin. Students then divide their notebooks into two columns. The left hand side is titled "Important Information" and the right hand side is "Test Questions". After all students have had the chance to read and underline (either during class time or as homework) we compile class notes on the board, listing all the information that was considered "important". Before copying this into their notebooks, students need to say if they "agree" or "disagree" with each point. If there is any disagreement, the student who suggested that fact needs to clarify his or her reasoning. Once all facts have been agreed upon, they are copied into notebooks. Next, students split into pairs. While in pairs, students fill in the right hand column. They brainstorm possible test questions related to each piece of information listed in the corresponding space in the left hand column. Students are instructed to use these notes as a study guide.

This method seems to work well in helping students identify the necessary facts in the reading. Initially, some questionable pieces of information were generated for the left

hand column, but the agree/disagree component of the activity allowed students to weed out the unnecessary or incorrect information by themselves. The more times we have done this activity, the fewer disagreements have arisen. Also, the test questions are beginning to take on evidence of deeper thinking. For instance, questions during the first chapter included, "What are the 8 characteristics of life?" and "What is the difference between sexual and asexual reproduction?" In latter sections, students began to generate questions such as, "What is the role of a lipid in your body?" and "What happens to your brain if you stop eating?"

In the future, I would like to refer more directly to the test questions generated by the students. I plan to have them submit their "favorite" questions, and use a few on the test. I think that extending the note taking process to include this element will not only demonstrate the immediate importance of understanding the material, but it will give students a greater level of responsibility and ownership during tests. It is my hope that we can reach a point where the students no longer tests as something that I "give" but as an opportunity to show that they know the material they thought was important.

Laboratory/Field Work

- Teach and adhere to safe procedures and the ethical use of living organisms.

Our very first lab, or hands on experiment, involved recording observations of earthworms in response to a change in the environment. Pairs of students were responsible for one earthworm. They were to add elements of cold, moisture, and darkness to the shoebox that contained the worm. They were then to record the worms' actions in response to the new stimulus. Students were carefully instructed on how to handle and treat the worms in a manner that would not harm them. This activity was successful and all worms survived the ordeal. At first, students were "grossed out" by the idea of touching a worm, but in the end most students overcame their initial fears and enjoyed conducting the experiments.

Following the experiment, the worms were placed in an artificial environment with dirt and plants. They have remained there since the day we did this activity. Occasionally, students will volunteer to water or feed them. I am not sure how many worms are still alive, but to this day students ask questions such as "Are the worms still in there?" and "How are the worms doing?" We also have two class pets. A small turtle named Carlos that one student brought in for me and a beta fish (who is still in search of a name). The students like to feed the animals on a regular basis. Some even come in after school to check on the animals.

I think that this activity, combined with the regular presence of animals in the classroom, has created a positive and ethical setting for the study of life.

Goals:

- Incorporate split log notes directly into test creation.

Standard 5: Assessment

- Employ evaluations that are not graded but are used for comprehension checks and student feedback. How often is this done?

This semester we have had approximately 4 "Quick Quizzes". Quick Quizzes are given in the form of an entrance ticket but they are passed in, rather than recorded in the notebooks. Quick Quizzes usually ask for a summary or clarification of a point from the previous class. On occasion, they solicit feedback from the students on the quality/value of an activity or they seek out any questions that may still exist in the class. They are graded in class work points and scored only for completion.

After completing a reading on The Characteristics of Life, compiling a class list entitled "What do all living things have in common?" and trying to dispel preconceptions (such as "all living things move") and quick quiz was given asking students to write down as many characteristics of life as they could remember. Unfortunately, this quiz demonstrated that many students were still holding on to their previous notions of what it means to be alive. Student responses included the following statements: "All living things need oxygen", "Water is alive", and "All living things eat food" (which differed from the in-class definition for using energy).

While the results of this quiz were a bit disappointing, it served as a valuable tool in adapting the flow of the course. This activity served as an example of the difficulty of eliminating students' preconceptions. It also acted as an informal method of checking the progress of all of the students. During class time, the students who are understanding the material take every opportunity to demonstrate what they know, but Quick Quizzes allow the less vocal students to communicate their understanding (or lack thereof) without the high stakes atmosphere of a graded test.

- Provide opportunities for self-assessment.

At the end of the first half of the quarter, students were asked to fill out self-evaluation forms. They were to rank their own performance on a scale of 1 to 6 in a variety of areas, including homework, class work, effort, and laboratory practice. There was also space allocated for student comments on each section. Students needed to complete this assessment before viewing their "calculated grades". We also spent some time reviewing how grades would be calculated (homework 20%, class work 50%, tests 30%) and how the point system works (ex: 27/50=54%). The importance of participation (being in class, prepared, and working can only help you) was also covered.

Once students had reviewed these topics, their mini-progress reports were distributed. Students were asked to compare their original self-evaluation to the calculated grades. Journal entries wee completed reflecting on any differences or similarities that may have existed. Students were also asked to identify one specific area for personal improvement. I found this activity to be valuable in identifying the breakdown of these grades and the source of any potential problems. Spending class time on this topic prevented (or at least reduced) the problem of angry or confused students and the placement of blame for poor grades. Examining grades at a non-vital time early in the quarter took much of the pressure off students and allowed them to objectively examine their progress.

As we near the end of the quarter, I would like to revisit these original assessments to see if students feel that they have improved in any way. I would also like to remind students where their grades are coming from. They should always be aware of how they can do well and how they can improve.

Goals:

- Revisit self-assessment to track progress.

Standard 6: Professional Knowledge and Growth

- Professional Journals and Publications:

I have found many interesting activities, techniques and labs in several professional journals. While many of these ideas are interesting and relevant, I have found that most are prepared for a general audience. In order to make them applicable to my situation, I need to make the appropriate changes. I have found that professional journals are most helpful when I use them as a springboard for activities and lessons that can more directly interest and involve my students. I suppose this is the real purpose of these publications, and making these adaptations will require time and experience, in addition to a better understanding of my students, their abilities, and limits.

During our upcoming unit on enzyme activity, I plan to use a modified version of a lab entitled "Supermarket Proteases". I found the original version of this lab in the most recent (October 2003) issue of The Science Teacher. This lab takes the somewhat intangible topic of enzyme reactions and implements the same ideas using materials that are more commonplace. Students can track the rate of enzyme digestion of gelatin proteins by monitoring the color change of the "Jell-O". Students can compare the reactivity rate that different materials have on the protein, including contact lens cleaner and meat tenderizer. This lab is designed to demonstrate that enzymes are more present than most students would originally think.

The lab allows for many different activities to be derived from its basic plan. It includes direction to monitor the effect of temperature and pH and also shows different ways to

track the color change (spectrometer or eyeballing the color's "intensity" over time). At this point, I think that I will have my students look at the effect of different substances and heat on the deepness of the color. We have not covered pH in depth, and I think that explaining the workings of a spectrometer may take more time than is necessary. I want the students to gain an understanding of enzymes, their roles, and their presence without further complicating the matter.

- Technological Literacy.

Technology is an area that I have struggled with during my student teaching. I am not sure how I can adequately introduce technology into a classroom (in a school) with limited resources. I suppose that if I had more time and my own classroom, I could put in the time and the energy to seek out donations of equipment. I have seen many experienced teachers do this with a (relative) great degree of success. But even with these materials, resources are very limited, especially in a classroom setting. (For instance, our room has 3 computers, sometimes the only ones working in the school, and one printer. This is great for students who come after school to type papers, etc. But assignments cannot require technology because all students do not have equal, if any access.) Right now, I am struggling with the following questions: How can I assign projects, etc that enable students to use whatever technology may be available but that do not require excessive access? Is it ok to make "technology optional" projects? But then, is this really teaching or modeling the appropriate skills…such as how to use the Internet effectively?

During the remainder of my student teaching I hope to explore this issue further, seeking out alternative methods of incorporating technology into the classroom. Hopefully, speaking with other teachers, as well as my students will help me to find ways to encourage appropriate use of technology as an academic tool.

- Professional Growth:

A.) My current Personal Inquiry Project can be used as a tool to increase my effectiveness as a teacher and to boost my students' comprehension skills. I plan to explore the following question: How can the use and importance of interpreting graphics* be integrated into the science classroom? (*Possible graphics includes the following: diagrams, charts, graphs, pictures, etc). Throughout the duration of the project, I will have students take reading comprehension quick quizzes. The point system will be used to compare scores at all points in the project. Do students demonstrate a greater amount or degree of understanding after the introduction of visuals? Are the students able to carry their knowledge over from the visuals and incorporate it with the reading?

> The topic for this project was prompted by careful examination of my students' literacy weaknesses. Often, students with difficulty reading and writing find it challenging to express their ideas in writing. The introduction of graphics into the

classroom curriculum will provide a new vehicle for students to demonstrate their understanding. While literacy remains to be a challenge in all classrooms, graphics will provide all science students, especially those who are special education and ESL, with a visual way to comprehend and explain material. Also, the use of diagrams and charts encourages interpretation and observation for all students.

Many times, my students do not have the language skills to express an idea. They do, however, have some sense of what they are trying to say. I have found that these students are usually more than happy to "draw me a picture" to explain themselves. I hope to provide a structured way to visually represent understanding so that students are able to apply what they have learned. While drawing and graphing will not (and should not) replace reading and writing, it may ease the struggle for many of my students.

B.) Personally, I view my continued time at Brown as a major component in my professional development. As I finalize my educational program here, I consider my interest in education, as well as engagement with subject matter, or course content, in the decision making process. While I feel that I have a strong base in biological sciences, I am facing course selection for my final semester with the following questions in mind: What classes will enable my to reach my students on various levels? What experiences will allow me to better understand my students' behaviors both in and out of the classroom? How can courses in various disciplines push me to be a more interdisciplinary teacher? I plan to fulfill these areas by including art, writing, independent research, and sociology in my personal curriculum. (This section will be elaborated on upon the completion of second semester courses.)

Goals:

- Effectively modify and implement lab activity as described.
- Integrate technology (as stated in Standard 6) despite limited accessibility.
- Successful completion of Personal Inquiry Project and academic coursework.

Standard 7: Engagement with Subject Matter

- Understand how knowledge in the discipline is created, organized, and linked to other disciplines.

During the summer of 2003 and the 2003-04 school year, I am enrolled in BI195/196: independent undergraduate research in biology. My thesis project will include a comparison of the vertical locomotor activity in an arboreal mammal (flying squirrel), terrestrial mammal of similar size (chipmunk), and an arboreal marsupial (sugar glider). My research will entail the following: experiment design, training animals, data collection via use of technological equipment, obtaining and analyzing three-dimensional film footage, data compilation, and public presentation. This project will serve as the

conclusion to a four-year program and an A.B. degree in Biology.

It is my intention to use this experience as an integrated component in my classroom practice. In teaching science, I would like to draw on the process of "doing" science. I feel that my first hand experience of the process, as well as the rewards and (especially) the frustrations of research will enable me to convey the importance of scientific inquiry and exploration. Having experienced the not always methodical scientific method, I hope to extend the idea of questioning to include my students.

Currently, I am working with my students to build up to there first inquiry based exploration. Upon the completion of this activity and the finalization of my research I will be better able to comment on the connection that I am seeking to establish.

Goals:

- Apply knowledge and skills gained from my experience in BI195/196 to create a more inquiry-based classroom.

Reflection on Artifact 3:

Writing a standards-based self-assessment half way through the student teaching experience provided a good opportunity for reflection as well as goal setting. I was pleased that this opportunity came at a point where setting some complex goals was practical. When I wrote this assessment, I was just beginning to feel comfortable taking more risks in the classroom, and I still had plenty of time remaining to try new ideas or implement new policies.

Artifact 4: Cooperating Teacher's End of Semester Evaluation

Please see placement file for letter of recommendation.

Standard 7: Engagement with Subject Matter

Reflection on the standard: Engagement with Subject Matter

- Understand how knowledge in the discipline is created, organized, and linked to other disciplines.

Research conducted as a part of the A.B. program in Honors Biology will serve as both my senior thesis project and artifact for standard seven. This work addresses the ecological and morphological relationships that contribute to terrestrial locomotion in arboreal species, in particular, Southern FLying Squirrels. My research includes the following: experiment design, training animals, data collection via use of technological equipment, obtaining and analyzing three-dimensional film footage, data compilation, and public presentation. The final written product for this project is not included here, as it is currently being revised for publication.