Comprehensive Portfolio of Learning

Submitted for completion of Master of Science in Education and secondary science certification in biology for New York State

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Personal Statement

As a teacher I hope to inspire interest in biology with my passion and experience in research while helping the students envision and pursue careers in the field. Developing lab and field experiments that challenge the students' creativity will make learning fun. This will help the students nurture and maintain an interest in academics in general, but specifically in biology. I believe it is important to lead students to compose their own questions and find answers through reading and experimentation.

Making the subject of biology relevant to the students lives by framing the lessons in context will make things easier to remember and more interesting to learn. Bringing the lecture back to questions like "How does this biological fact or issue affect your daily life? " "How does it affect the world?" "How can you use the knowledge in the future?" will keep students from getting lost in the details and focus on the big picture.

Just as I need to effectively communicate the material at hand, I will help students learn to effectively communicate through writing and presentations. While encouraging their communication I will recognize, respect and learn from individuality and diversity within the classroom.

I wrote this teaching statement in 2004, before I had any classroom teaching experience. It turns out that my vision is supported by research. I stand by this statement today, which demonstrates an instinct for teaching. Today, however, I have the theory and practical knowledge to effectively implement my vision.

I gained the background knowledge and pedagogical methodology while working toward a master of science in education and student teaching at the University of Rochester (UR),

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Warner School. In addition to being certified to teach seventh through twelfth grade science in the fall of 2011, I will add a fifth and sixth extension in 2012. I have taught both middle and high school science courses and volunteered for 50 hours in fifth and sixth grade classes and 200 hours in a middle/high school. All experiences were in the Rochester City School District.

While my experiences teaching an introductory lab course at the UR and a lecture and lab course on evolution and biodiversity at Finger Lakes Community College were intensely satisfying, I recognized that I could be more effective with training. I decided to attend the UR, Warner School with a full scholarship, funded by the National Science Foundation. I enjoyed and excelled at all of my theoretical classes at Warner - learning how people learn most effectively. However, student teaching was the most challenging and invigorating portion of the program.

I taught four weeks of honors and inclusion Living Environment as well as Advanced Placement Environmental Science. For eight weeks I taught eighth grade science, honors and inclusion. In both placements, I taught genetics. In my four week placement, I created inquiry activities about homeostasis/the endocrine system and DNA. In my eight week placement I developed an innovative unit on evolution that involved a variety of pedagogical methods, including inquiry and independent research.

My interest in education has been evident throughout my life. In high school I taught art in a YMCA after school children's program. As an undergraduate at Berkeley, I worked as an outdoor educator, assisted in a remedial reading program, and worked in teams to develop and implement two after-school environmental education programs: one for kindergarten through 4th graders and one for high school students. In graduate school, I led educational field trips around the University of Washington fish hatchery.

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However, I took a while to decide what age I wanted to teach. En route to my teaching certification, I earned a bachelor of science degree University of California, Berkeley. I studied biochemistry, genetics, physiology, natural history, and developmental biology, but emphasized ecological processes. It gave me a broad base of knowledge on which to build my graduate education. I earned a master of science in fisheries ecology at the University of Washington and completed all required coursework for a doctor of philosophy degree in evolution at the University of Rochester.

In biology graduate school, I chose coursework reflecting my interest in multi-level approaches to research questions. Coursework included fish physiology, reproduction, natural history, stream ecology, and biological oceanography. I fleshed out my quantitative abilities with several statistics classes. My thesis involved designing and completing a series of lab experiments on the effects of growth and feeding on survival of juvenile salmon under stress - a physiological approach to broader ecological management questions on the Columbia River.

I have worked mostly in basic biological research to guide management, restoration, and conservation decisions. My experiences in field biology and enthusiasm for the subject and its possibilities help make me in the classroom. I have a breadth and depth of knowledge that qualify me to teach general science courses, biology courses, and environmental science courses.

My interest in approaching problems from several angles and my ability to see things from other's points of view make me an effective educator. I am able to intuit what works well for each student in my class and design lessons that allow individuals to gain confidence and knowledge in a way that is most effective for them.

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Most importantly, I think the world of science is constantly amazing and fun and I want to share this enthusiasm with students.

My theoretical framework outlines my vision, based in theory and practical studies:

Dewey (1916) was right. We want a human population that has critical, scientific thinking skills that they can apply to their daily life, political decisions, and work. Creating a scientifically literate population requires that students are taught the nature of science. Evidence suggests that using "The Scientific Method" as a teaching model has led to a population that misunderstands science and therefore has negative attitudes toward science classes and scientific information (Clough, 2000). What we want students to internalize about the nature of science is as follows: Science is a way of searching for answers. The answers are never certain, but are formed from and supported by empirical evidence. The methods of searching vary from observation to experimentation, but the conclusions are based on data. As the data change, so must the conclusions drawn from those data. Individual scientists have biases, so they use peer review to verify their results and conclusions. Scientific investigations do not prove hypothesis, they either support or reject them. We want them to identify as scientists and to be able to use this identity in their every day lives. "Transfer is our great and difficult mission because we need to put students in a position to learn far more on their own, than they can ever learn from us" (Wiggins and McTighe, 2005, p 44).

The most effective way to teach the nature of science is by doing inquiry based lessons (Lederman, 1992). One advantage to inquiry based lessons is that they naturally support differentiation among students (Scruggs, Mastropieri, & Okolo, 2008) Widschitl (2008) offers a simple framework of conversations with which to approach teaching inquiry, and stresses the importance of using inquiry projects that incorporate the content we want the students to learn.

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Inquiry projects should relate to scientific content at the very least (Trefil, J and O'brien-Trefil, 2009). At their best, inquiry projects also relate to the students lives. By choosing science topics that the students can feel a direct connection to, and then allowing them to specify the questions of interest within the topics presented, we enable the students to take ownership of the project, and thereby, see themselves as scientists. "If a student sees himself or herself as becoming a scientist…then science content tasks may be perceived as being more important, regardless of his or her mastery or performance orientation to learning" (Pintrich, Marx and Boyle, 1993, p 183). In addition to relating current science topics to students' lives, presenting "the historical, philosophical and sociological foundations of science" (Clough, 2000, p 13) gives students a deeper interest in and understanding of both the content and nature of science. Walking students through the dead ends and wrong turns leading to a supported hypothesis or theory can imply the nature of science. The nature of science can also be explicitly articulated in the context of a given story. Lederman (1992) and Chiapetta and Koballa (2010) stress the importance of inquiry based instruction using real-life problems. These are similar ideas, that doing real science, and hearing/reading stories of real science in action, including social and historical context makes science more interesting and more accessible.

Even if students can relate content to themselves, they will not necessarily engage with it effectively unless they can also relate it to a larger concept. "To remedy this situation, teachers have to be very clear about what big idea(s) students should know" (Olson, 2008 p 46). Many students need to have a big picture in which to place the smaller pieces of the puzzle, or they will disengage (Behm, 2001).

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"In urban secondary schools, multiple ethnic, peer, home, and community Discourses meet multiple content and pedagogical Discourses, resulting in complex interactions among the literacy and language practices and Discourses enacted in such classrooms" (Moje, 2001, p 473). To deal with these interactions, four things are necessary in the classroom: "(a) drawing from students' everyday Discourses and knowledges, (b) developing students' awareness of those various Discourses and knowledges (cf. New London Group, 1996), (c) connecting these everyday knowledges and Discourses with the science discourse genre of science classrooms and of the science community, and (d) negotiating understanding of both Discourses and knowledges so that they not only inform the other, but also merge to construct a new kind of discourse and knowledge" (Moje, 2001, p 489). While discussing their investigations with the students, I will be cognizant of the socio-cultural/gender identity and the lens through which they see the world. While I can never actually see through that lens, I will do my best to incorporate their vision and prior knowledge into our lessons and discussions. I will acknowledge their thoughts and push them in the appropriate direction without criticizing them as a person. I will make my classroom a safe place to make mistakes and a safe place to view things differently from one's classmates. Questions will be encouraged and always respectfully responded to. Students will treat each other as well as me with respect. I will create a third space in which to construct scientific knowledge together (Driver et al. 1994). While many students in Brown (2006) talk about the hands-on nature of science and how that helps them understand the subject, almost none recognize themselves as scientists. This implies that a need for recognizing "students' discursive identity as an influential component of their performance in science classrooms" (121). While word choice matters for teaching and learning the nature of science (Schwartz, 2007), the language of science is also the main

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reason cited in Brown (2006) for students' not identifying with science. By allowing students to describe things in their own words first and then giving them the appropriate terms, hopefully understanding will precede dissociation due to language barriers. For instance, by co-constructing a list of processes required for life before labeling the organelles in a cell that carry out those functions.

An important part of science, is the community that it creates and operates within (Driver et al. 1994). Incorporating small and large group projects into my classroom culture, and encouraging collaboration as much as possible will help communicate. Similarly, telling stories of discovery including all the contributing scientists names and historical context communicates the collaborative, additive nature of science.

I will always design the assessment of student learning first, and work backwards from there so that we have a clear vision of what knowledge we want the students to gain from any given unit (Hendrickson, 2006). Assessments will vary in approach from tests, through journals, writing assignments, lab investigation write ups, oral discussions to video documentaries. Assessments will occur for both the group and for individuals. Multimodal assessment will offer varied learners different opportunities to express what they have learned. Hopefully, the assessments will be integrated with learning enough that they are not the focus of student work. Mastery of the subject is the goal of student work.

By proposing problems that affect their lives and scaffolding investigations appropriately depending on age/ability, I will hopefully find their intrinsic motivation for mastery. Like critical science education theorists (Fusco and Barton, 2001), I believe that scientific literacy is empowering and should be available to all people.

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I have met all of the requirements laid out by the state of New York for a certificate in teaching secondary science (biology), and, as the following portfolio will demonstrate, I am competent in all the principles laid out by the Warner School of Education.

1. Content Principle

NSTA standard:
1.a Candidates understand and can successfully convey to students the major concepts, principle, theories, laws and interrelationships of their fields of licensure and supporting fields as recommended by NSTA.
1.b Candidates understand and can successfully convey to students the unifying concepts of science delineated by the National Science Education Standards.
1.c Candidates understand and can successfully convey to students important personal and technological applications of science in their fields of licensure.
1.d Candidates understand research and can successfully design, conduct, report and evaluate investigations in science.
1.e Candidates understand research and can successfully use mathematics to process and report data, and solve problems, in their fields of licensure.
2.a Candidates understand the historical and cultural development of science and the evolution of knowledge in their discipline.
2.b Candidates understand the philosophical tenets, assumptions, goals and values that distinguish science from technology and from other ways of knowing in the world.
2.c Candidates engage students successfully in studies of the nature of science including, when possible, the critical analysis of false or doubtful assertions made in the name of science.
3.a Candidates understand the processes, tenets, and assumptions of multiple methods of inquiry leading to scientific knowledge.
3.b Candidates engage students successfully in developmentally appropriate inquiries that require them to develop concepts and relationships from their observations, data and inferences in a scientific manner.

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4.a Candidates understand socially important issues related to science and technology in their field of licensure, as well as processes used to analyze and make decisions on such issues.
4.b Candidates engage students successfully in the analysis of problems, including the consideration of risks, costs and benefits of alternative solutions; relating these to the knowledge, goals and values of the students.
5.b Candidates successfully promote the learning of science by students with different abilities, needs, interests and backgrounds.
5.e Candidates understand and build successfully upon the prior beliefs, knowledge, experiences, and interests of students.

Warner 1.1 Candidates have a broad preparation in the subject areas(s) taught, consistent with professional and New York State standards.

I have a deep understanding of biology at levels from the cellular/molecular up to the systems/ecological level (W 1.1). This is demonstrated in my 145 credit hours of coursework in biology at the University of California, Berkeley (UCB), the University of Washington (UW) and the University of Rochester (UR). My ability to successfully design, conduct, report and evaluate investigations in science is demonstrated by my master of science thesis from UW (W 1.2, NSTA 1.d, 1.e) (Cobleigh, 2000)(The file, CobleighThesis.pdf is in the Portfolio folder, but I can not link to it.). I have also worked as a biologist for several years at UCB, East Bay Municipal Utilities District, and United States Geological Survey doing research to guide management decisions (W 1.2, NSTA 4.a). I passed my New York State Teacher Certification Examination in Biology with a 293 out of 300 points.

I have satisfied all the requirements laid out in my Program Plan of Study, designed with my advisor, April Leuhmann. I have passed all required exams (LAST, ATS-W, and Biology Content). The Warner student services office has the confirmation that I passed the LAST and ATS-W. They sent me this table:

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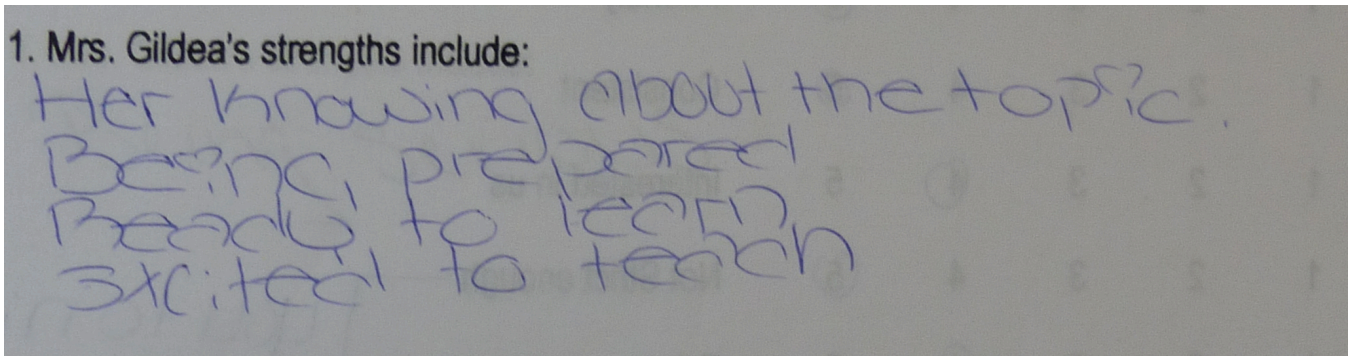
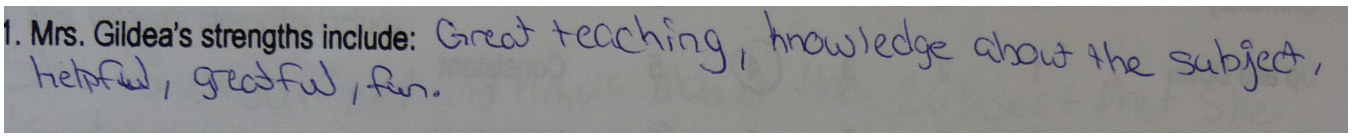
			Seconday ATS-W	Student ID				Pass/ Fail	Total Score	Student Development and Learning	Instruction and Assessment	The Professional Environment	Instruction and Assessment
W	TB3	ATS	Gildea	Molly	3E+0	2011	4/24/	P	273	300	262	259	273

Schoo	Major	Exam	LAST	Student		Year	est Da	Pass/ Fail	Total Score	Scientific, Math, & Tech. Processes	Historical & Social Scientific Awareness	Artistic Expression and the Humanities	Communication and Research Skills	Written Analysis and Expression
W	TB3	LAST	Gildea	Molly	3E+0	2010	9/25/	P	285	300	276	300	288	260

Before enrolling at Warner, I taught two college level courses in biology. Many of my teaching evaluations mention my strong content knowledge. Here are a few examples from my student teaching:





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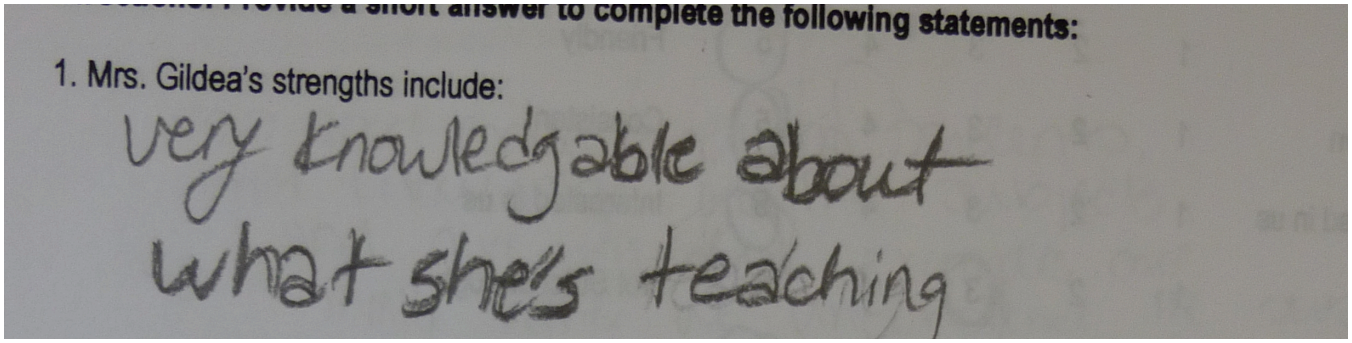
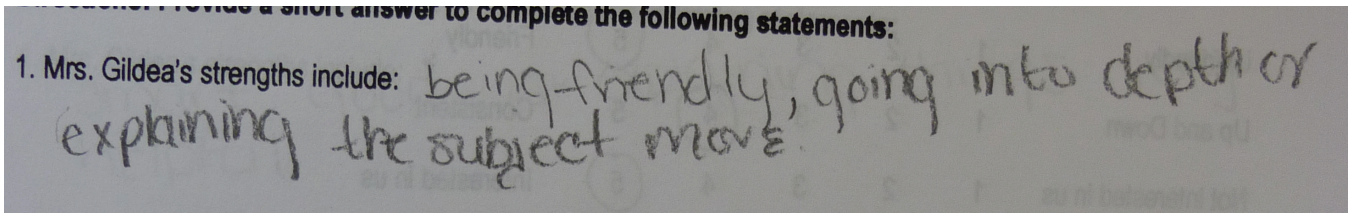
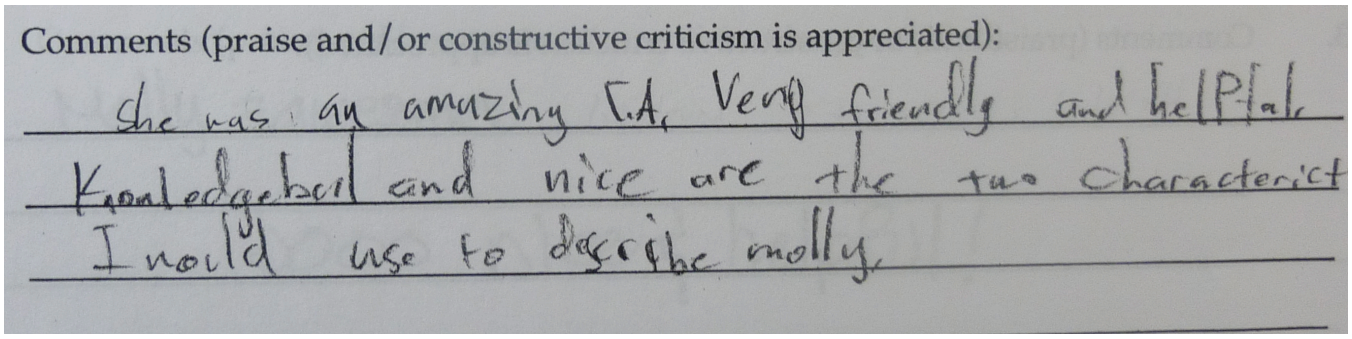
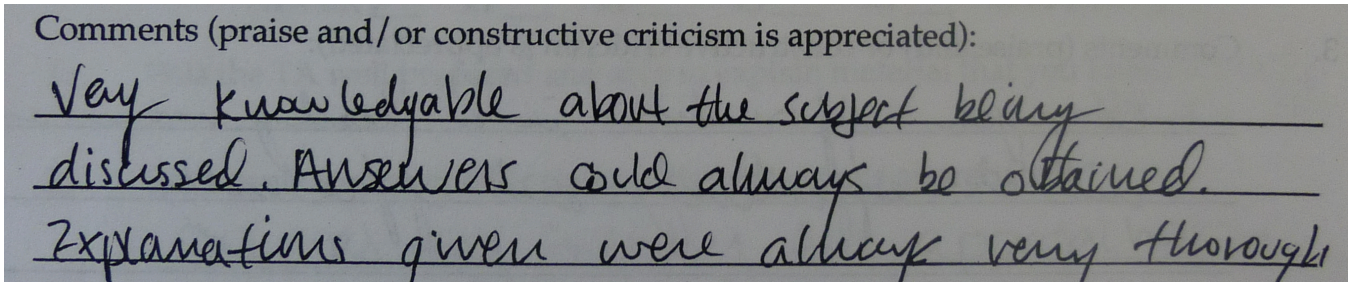




And from the lab I taught as a graduate student in biology at the University of Rochester:





I also received a 4 on my student teaching evaluation from my co-operating teachers,

Lawanda Brown and Peter Kalenda.

Warner 1.2 Candidates have a good understanding of some of the central concepts, tools of inquiry and structures of the subject matter (s) taught and have developed strategies and skills to continue their learning in this area.

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The nature of science has been an integral part of my being since childhood. Through my studies at Warner, I have learned to articulate what the nature of science is more explicitly (W 1.2, NSTA 1.b, 3.a,). For example, here is a quote from my theoretical framework from EDU 448:

> What we want students to internalize about the nature of science is as follows: Science is a way of searching for answers. The answers are never certain, but are formed from and supported by empirical evidence. The methods of searching vary from observation to experimentation, but the conclusions are based on data. As the data change, so must the conclusions drawn from those data. Individual scientists have biases, so they use peer review to verify their results and conclusions. Scientific investigations do not prove hypothesis, they either support or reject them. We want them to identify as scientists and to be able to use this identity in their every day lives.

I have also learned/developed methods of teaching students the nature of science, the nature of inquiry, and how it differs from other ways of seeing the world during my coursework at Warner. The most effective way to teach the nature of science is by doing inquiry based lessons (Lederman, 1992).

I have developed several inquiry lessons, beginning with Get Real! Science Camp, in STARS, in my innovative series of three and my four week placement, as well as in my eight week placement. In Get Real! Science Camp, we worked with middle school students. First, we performed an assessment of prior knowledge that would allow us to build upon their prior beliefs, experiences, and interests, as well as identify and address misconceptions (NSTA 5.e). We introduced them to the problem of Lake Ontario Beach being closed all the time. This problem is relevant to the students because it is hot in Rochester during the summer, and this beach is most accessible by public transit - it is where they should be swimming during the summer, but can not most of the time. The relevancy of the topic made science seem applicable to their lives and useful (NSTA 1.c). From here, my team (including co-teachers

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Tyler Lucero, Ben Giesselman) and I worked together to develop a testable question and a model. We gave them the big picture and described the equipment that we had, then let them develop a question and procedure.

Our testable question was. “How does algae and turbidity affect bacteria?” Our working model was that sun kills bacteria and if there is lots of algae and/or other turbidity then the sun can not get to the bacteria and kill it. Once we settled on a testable question, we acted out a model with each student and teacher role playing in the model. Below is a picture of sunlight trying to get past the algae to break down the bacteria.

We also formalized this model by drawing it with sidewalk chalk and on paper to keep and revise after we tested it. The following day the students collected data in one big team.

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We ensured that each student got the opportunity to use the equipment, which has been cited as important to developing an identity as a scientist (Chatman, et al., 2008).

Following data collection we analyzed the data as a team, and drew conclusions (NSTA 1.e). We then critiqued another group's work while they critiqued ours. We evaluated whether their procedure produced the data to answer their testable question, as well as whether their data supported their hypothesis (NSTA 2.c).

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Once we were confident in our conclusions, we produced a poster and video presentation to share with their school community. In this video and poster we offered possible solutions to the problem and weighed the benefits and costs of our proposed solutions (NSTA 4.b)

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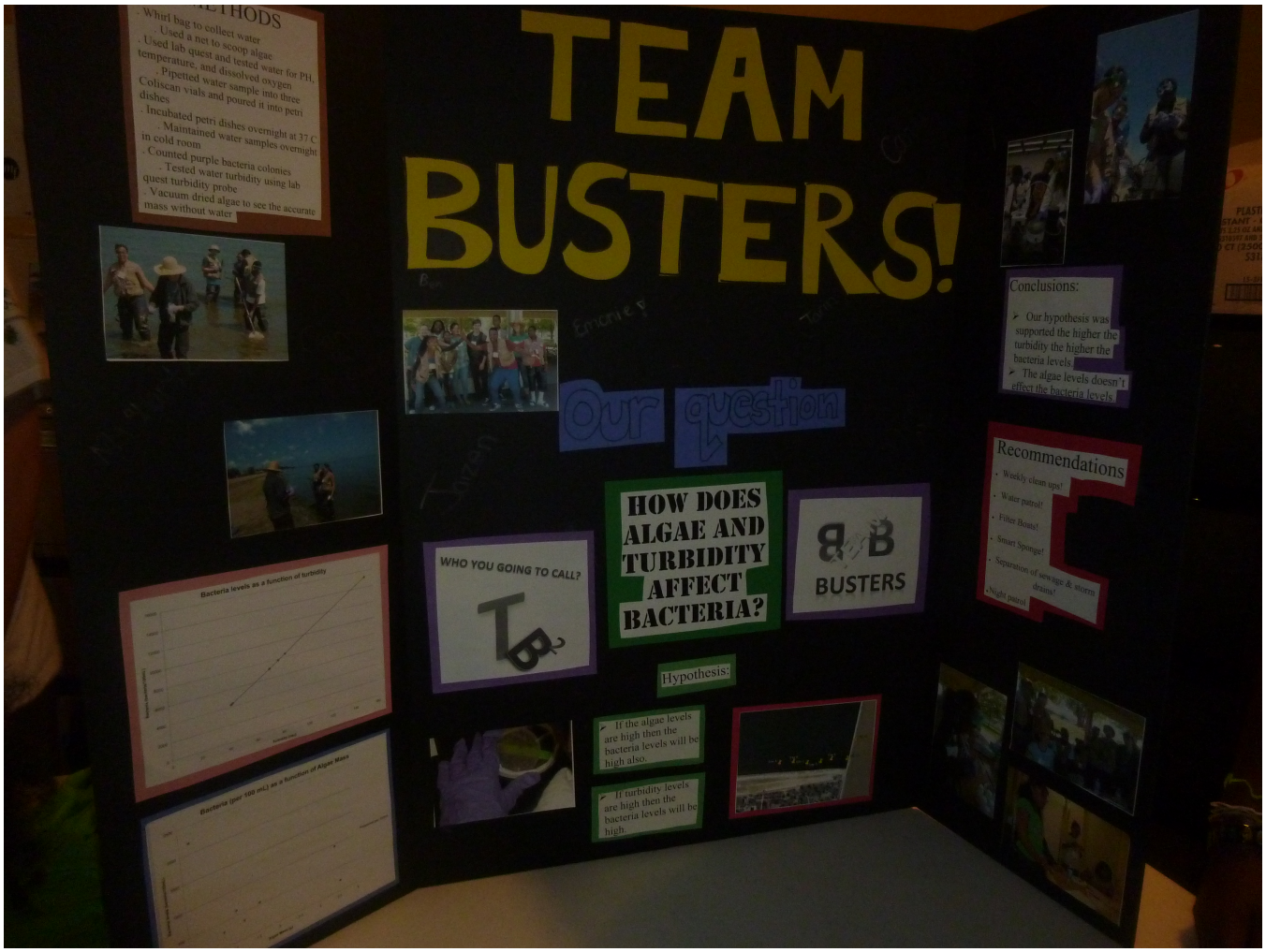

This was inquiry at its finest, relevant, hands on, and content rich (Trefil, J and O'brien-Trefil, 2009). This whole project was a tour of the unifying concepts of science. This includes, but is not limited to finding a problem, forming a question, developing a model, hypothesis, and procedure for answering that question, collecting data, and drawing conclusions. In addition the students participated in peer review and presentation of their findings with recommendations for further research and management implications (NSTA 1.b, 2.b, 3.b, 2.c, 3.a, 4.a, 4.b). These last two components are often left out of school science activities (Windschitl, 2008).

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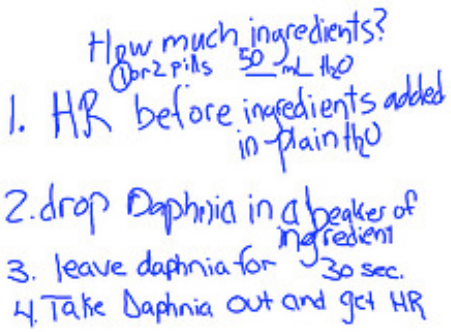
In STARS, we followed a similar model of guided inquiry (NSTA 3.b). Our unit plan describes the process we followed from developing a question that related to the students lives (NSTA 4.a). From our unit plan:

> The testable question that they chose related to their lives because even if they do not personally drink energy drinks, they all know someone who does. The relevancy sparked the students interest and allowed them to take ownership of the project.

Linking it to their own health, and that of their friends enabled them to see an application of science in their own lives (1.c).

The girls developed their own question and procedure as well as analyzed the data, and (NSTA 1.e) presented.



My knowledge is especially strong in ecology and evolution. In my first placement, I taught one small lab on ecology to the Advanced Placement Environmental Science class. I had no preparation time for this lab, and there were a few small procedural mistakes made, but I know that the students got the main points that I wanted them to out of it. This is a skill I have

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always had - finding the important points of an article or discussion and making them apparent to others (W 1.4, NSTA 1.a).

Warner 1.3 Candidates are familiar with the principles and concepts delineated in professional, New York State and Warner School Teaching and Curriculum standards, and their implications for curricular and instructional decisions.

This portfolio is evidence of my familiarity with the National Science Education, New York State and Warner School Teaching and Curriculum standards. In particular, my lesson plans, Innovative Unit and the planning section of the portfolio illustrate this. You can see my grades/comments and rubric for the innovative unit and unit analysis paper. I received 4s in planning (including using standards) from both of my co-operating teachers, Lawanda Brown, and Peter Kalenda.

Lawanda Brown:

7. PLANNING PRINCIPLE:
The teacher candidate plans instruction based upon knowledge of subject matter, students, the community, and curriculum goals.

Proficiency:	*n/o*	*1*	*2*	*3*	*4*
7.1. Candidates are able to align instruction with learning goals consistent with professional and New York State standards.					x
7.2. Candidates are able to implement lessons according to a well-defined and high quality plan.					x

Additional comments:

Molly spent countless hours planning each of her lesson and asking for feedback through the process. I would often critic the lesson after the first demonstration. She was open to constructive criticism and adjusted the lessons accordingly.

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Peter Kalenda:

7. PLANNING PRINCIPLE:
The teacher candidate plans instruction based upon knowledge of subject matter, students, the community, and curriculum goals.

Proficiency:	*n/o*	*1*	*2*	*3*	*4*
7.1. Candidates are able to align instruction with learning goals consistent with professional and New York State standards.					X
7.2. Candidates are able to implement lessons according to a well-defined and high quality plan.					X

Additional comments:
Molly built all of her lesson plans w/ the framework of NYS standards. If of her lessons listed w/ standards/principles were addressed

Warner 1.4 Candidates are able to create learning experiences that make the subject matter meaningful and relevant for all students.

In my second placement, I had to opportunity to design a whole unit on evolution with my co-teacher, Theresa Milano. We worked hard to make this learning experience meaningful and relevant for all of our students (W 1.4). To make it accessible (NSTA 5.b), we started with a set of hands on stations activities. One advantage to inquiry based lessons is that they naturally support differentiation among students (Scruggs, Mastropieri, & Okolo, 2008) (NSTA 5.b). At the stations, the students were to envision themselves as Darwin, studying data similar to that he presented in his book, On the Origin of a Species by Natural Selection. The students worked in groups at self guided stations with manipulatives, images, graphs and movies. Using the data provided, students answered scaffolded questions leading them toward "discovering" evolution on their own. Over the weekend following the stations, students

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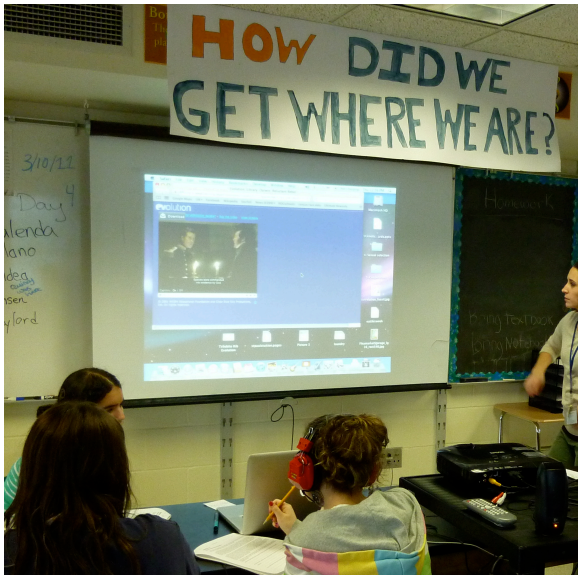
answered scaffolded, reflective essay questions pushing them closer toward articulating a theory of evolution. Following these two days of stations, we presented the theory as Darwin described and supported it, then asked the students to reflect on the differences between their findings and his.

I am very much a big picture person, which I believe will be important and useful in teaching. Putting content in context - in the big picture, and making things relate to each other will keep the students engaged, as well as make it easier for them to understand things. Clough states that teachers should not ignore, "the historical, philosophical and sociological foundations of science" (Clough, 2000, p 13). Lederman (1992) and Chiapetta and Koballa (2010) stress the importance of inquiry based instruction using real-life problems. These are similar ideas, that doing real science, and hearing/reading stories of real science in action, including social and historical context makes science more interesting and more accessible. In my own classroom, I intend to use evolution as the unifying, big picture theme for the course - everything we study from cells to ecology will be approached through the lens of "How could this evolve? Why would this come to be?" In our evolutionary unit, we brought students back to the big picture, essential question in our evolution unit as much as possible, including posting it at the front of the class room, and including it as a short answer question at the end of the unit test (NSTA 1.a).



In addition to being able to clearly articulate our current understanding of the biological world, I know many of the historical stories behind the findings

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(NSTA 2.a). When I presented Mendelian Genetics to my class in my first student teaching placement, I also presented a brief story of Mendel, his life at the monastery, the historic connection between science and religion, and the way that his findings unlocked the mystery of Darwinian evolution. In my second placement I used this technique again, because I think it is really interesting, and inspiring that he discovered so much with so little technology. It also highlights the need for sharing information (NSTA 2.b), because his findings did nothing until they were "re-discovered" at the turn of the 20th century. You can read my description of Darwin and Mendel's story in my Disciplinary Knowledge Paper.

In our evolution unit during my eight week placement, Theresa and I created an interactive timeline. The students worked in groups to gather information about an important individual in the history of the theory of evolution and then presented their person as part of a timeline. They had to include information about who influenced them, what their big idea was,

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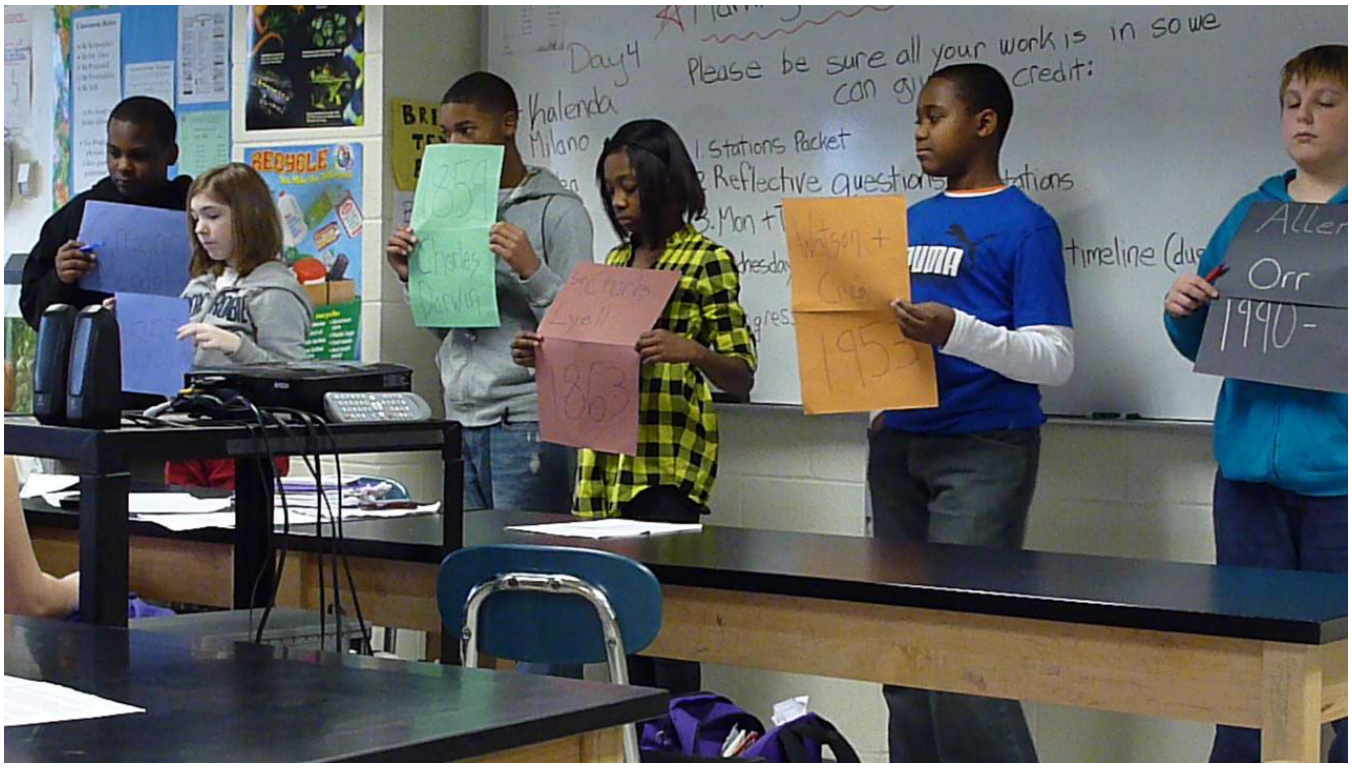
and whom they influenced.



Following the activity, the students answered reflective questions about the nature of science, "standing on the shoulders of giants," and collaboration (NSTA 2.b, NSTA 2.a). An important part of science, is the community that it creates and operates within (Driver et al. 1994). This activity both in the collaborative pedagogy, and in content immersed students in this aspect of the nature of science (NSTA 2.c).

My content knowledge of body systems is not as deep, but it is sufficient to help the students gain an understanding of how their body works. I taught my series of three on the endocrine system. I was able to write a lab that led the students to understand the need for us to have control systems in the body without being told explicitly. Their understanding was evident in the class discussion following the lab. In this lab, they were in charge of maintaining a fish's homeostasis, modeled by the temperature of its water. While doing this, they

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simultaneously shared a stressful experience, which was intended to induce a mild stress response. On their lab write ups and in class discussion students said things like,

> "The fish stopped moving so i was feeling sad like i killed it. My heart was racing."
>
> "I am tired, my skin temperature is cold, i have goose pimples, i'm constantly under stress, my heart rate feels normal, emotionally, I hope the people working within the group who are handling the fish don't kill it."
>
> "I was nervous when the degree reached 30. I was at the edge of my seat. my hear was racing, but i was kinda calm because i knew my fish would survive."

These quotes demonstrated that they did experience a stress response. The shared experience gave us an excellent segue into a presentation into the workings of the endocrine system the next day by making it relevant to them (NSTA 5.b, 5.e, W 1.4). In addition, they made the connection to why we needed systems to maintain homeostasis autonomically.

> "If we had to do it ourselves, we'd be constantly taking our coats on and off and we wouldn't be able to do anything else"

I have a broad (and deep) preparation in biology, consistent with professional and New York State standards. I have a good understanding of some of the central concepts, tools of inquiry and structures of biology and I continue learning biology through conversations with my friends who are biology professors and researchers as well as by reading science news articles and academic papers. I am familiar with the principles and concepts delineated in professional, New York State and Warner School Teaching and Curriculum standards, and their implications for curricular and instructional decisions. I am able to create learning experiences that make the subject matter meaningful and relevant for all students, which is evident in the lessons I have highlighted above.

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2. Learning Principle

Warner 2.1. Candidates understand human development and how it is affected by context.

There is disagreement about the proportional effect of biology versus environment on human development. Steinberg (2008) offered some biological/developmental bases for adolescence. Similarly, Piaget believed in a universal progression of development (Rogoff, 2003).

Rogoff (2003) demonstrates through examinations of other cultures and the pre-industrial United States (US), that adolescence is not a universal (and therefore biological) phenomenon. Instead, she argues that is is a social construction that occurs in the industrialized, Western world because adults and children of adolescent age do not interact much. In Mayan culture, and in pre-industrial US, children work(ed) along side their parents and other adults and assume(d) additional responsibilities as they are ready. Now there is a sort of holding period in which adolescence occurs between childhood and adulthood (Rogoff 2003). Lesko (1996) and Maira and Soep (2004) also argue that adolescence (and our view of development in general) is a social construct. Our society differs from many societies not only in that we have this adolescent period, but also in how we view development in general.

Unlike Lesko (1996) and Maira and Soep (2004), I do not believe that adolescence is purely a social construct. As a biologist, I know that every human goes through a similar physical development, part of this involves hormones and part involves changing brain structures. In Piaget's developmental theory, the sequence of stages in the development of thinking was important, but not the age at which new developments occurred" (Rogoff, 2003,

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160). In the United States (US), however, we are fixated on the age at which things occur. This has consequences in our education system (Rogoff, 2003).

One important part of human development is learning communication. In her studies of deaf students, Ramsey (1997) argues that social interactions are how children usually learn language. It is the most natural, easiest way. This is important because denying a child early communication may also deny them future cognitive abilities. Ramsey (1997) believes higher mental functions - the cognitive and symbolic abilities and the strategies for learning that we expect children to acquire in school - originate as relations between people. "At least one source of the consistent problems deaf children experience at school may not be their inadequate English proficiency or their hearing deficit but a more profound lack of access to a fully elaborated, culturally living symbol system that they can exploit to further their activities with the world and with other people" (Ramsey 1997, p ???).

Communication is important, not just for deaf students, but for all. The way that teachers use words in class can have profound effects on their students' engagement with the material and, if Ramsey is correct (as I think she is) their ability to form thoughts and perform higher level thinking. Lederman (1992) found language use was important. "When teachers used 'ordinary language,' without qualification" (p 14) students viewed science as "true, real, existing independently of personal experience" (p 14). "Alternatively, when teachers use precise language with appropriate qualifications" (Lederman, 1992, p 14), students have a view that emphasizes "the practical utility of scientific explanations, role of human imagination and creativity in the development of scientific knowledge, tentative nature of science" (Lederman, 1992, p 14).

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This is particularly important in urban schools, where “multiple ethnic, peer, home, and community Discourses meet multiple content and pedagogical Discourses, resulting in complex interactions among the literacy and language practices and Discourses enacted in such classrooms” (Moje, 2001, p 473). To deal with these interactions, four things are necessary in the classroom:

a) “drawing from students' everyday Discourses and knowledges,
b) developing students' awareness of those various Discourses and knowledges (cf. New London Group, 1996),
c) connecting these everyday knowledges and Discourses with the science discourse genre of science classrooms and of the science community, and
d) negotiating understanding of both Discourses and knowledges so that they not only inform the other, but also merge to construct a new kind of discourse and knowledge” (Moje, 2001, p 489).

While in the US we sort students by age, and basically only age, it is important to keep in mind that individual students developmental paths vary in speed, and are context dependent. Teachers need to know their individual students and be able to gear their lessons toward them. Science lessons often involve building or manipulating models. “Teachers must choose models for which the students are ready and interested in otherwise they will manipulate the models without understanding (e.g. rulers, triangles/inclined planes)” (Lehrer and Schauble, 2000, p ???). Models can come in any form, but are an important part of learning. “Pretend play is modeling, pre-schoolers can also do some direct numerical modeling” (Lehrer and Schauble, 2000). However, creating a model is not the end goal of a lesson. Teachers “must remember that modeling doesn’t end with the model - students must also evaluate the models” (Lehrer and Schauble, 2000).

Models build on each other, in classroom learning and in life. “Students must build their own meanings on knowledge they already posses” (Novak, 1991). Our instruction should take advantage of this existing knowledge and use it to build new knowledge. “We must base

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instruction on how children think while also helping them learn to think more complexly - we should think in terms of years not weeks" (Lehrer and Schauble, 2000).

As models are an important part of understanding the world around us, they are a key component of inquiry education. Inquiry is the most effective way to teach the nature of science (Lederman, 1992). In his observations,

> "the classes of the most effective teachers were typified by frequent inquiry oriented question, active participation by students in problem solving activities, frequent teacher-student interactions, infrequent use of independent seat work, and little emphasis on rote memory/recall. ... classroom climate [was] more supportive, pleasant, and 'risk-free'" (Lederman, 1992, p 13)

Inquiry is more effective than many other methods, especially direct transmission of information from teacher to student. "Rote learned material is forgotten within weeks if it is not continually reenforced" (Novak, 1991).

Inquiry, gives students the opportunity to construct their own knowledge and understanding. Teachers should incorporate content and checks for understanding into their inquiry lessons. The checks expose misconceptions that can then be addressed. "Inquiry experiences should foster a deep and well-integrated understanding of important content, as well as the reasoning skills and practices of science - the separation of 'learning content' and 'doing inquiry' is entirely unnecessary" (Windschitl, 2008, p 3). Much of the learning during inquiry comes from discussions between students or between students and the teacher. "Part of good teaching is knowing when and how the supporting activities can contribute to students' conversations about the core knowledge-building activities of science" (Windschitl, 2008, p 17).

While hands on inquiry can be engaging in itself, it is important to also relate the topic to the students lives. Making things local, relevant and personal engages students at an even

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deeper level. However, even if students can relate content to themselves, they will not necessarily engage with it effectively unless they can also relate it to a larger concept. "To remedy this situation, teachers have to be very clear about what big idea(s) students should know" (Olson, 2008 p 46). Many students need to have a big picture in which to place the smaller pieces of the puzzle, or they will disengage (Behm, 2001).

To conclude, students learn best doing hands on, inquiry based tasks that investigate problems that are relevant to their lives and framed by a big picture of the curriculum and the world. To work with these problems they need to be able to conceptualize appropriate models and to communicate their thoughts effectively to themselves, their peers and their teacher.

Warner 2.2. Candidates understand that all students construct knowledge through active engagement in culturally valued activities and know what is appropriate for their students to learn, based on their age/grade level and the strengths, experiences and resources of their family/community background.

and

Warner 2.3. Candidates are able to provide learning experiences that take into consideration the students' development level and draw on the strengths and resources available in students' prior experiences, as well as the school, family, and community contexts in which they live.

Deep learning can not take place if the students are not engaged in the subject at hand. Therefore, as much as possible, content topics should be geared toward issues of importance to the students in the classroom. By creating inquiry lessons that bring real life into the science classroom, and science into "real life," I engage my students and validate their cultural experiences not as antithetical to academia, but as an integral asset to success in academia. I have done this in out of school settings at Get Real Science Camp, in an after school program, and in my 4 and 8 week student teaching placements.

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At Get Real Science Camp (GRSC), we (Tyler Lucero, Ben Giesselman and I) guided the students to ask their own question and design an investigation within the framework of "why is Ontario Beach closed so often?" This question matters to them, because it is their beach, their city. Almost every one of our campers spent time at this beach, but none swam at the beach because they knew that it was dirty. It is hot in Rochester in the summer, and being able to swim would be a welcome respite.

I wrote lesson plans for the data collection and for preparing the presentation of or findings. The students were actively engaged both of these days, as illustrated by the following pictures:

Here we are all dressed for data collection.

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Here our campers are actively collecting data and culturing bacteria.

Here our campers are preparing to make a video presentation of their results. You can see from the pictures that they were not only

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engaged in the project intellectually, but that they had a great time. From the beginning of the week, they worked in a cohesive group with us (pre-service teachers) as active participants in co-constructing our investigation. As a team, we walked the beach, came up with a relevant and testable question, then, developed a model of why the beach is closed so often. We made this a "hands on" activity by having them act out the model as a play. (See pictures to the right.) From there we moved on to procedural design, data collection and analysis. GRSC follows the model of active, relevant, inquiry projects developed and completed through effective group communication.

In Students Tackling Authentic and Relevant Science (STARS), an after school program for under-served girls, we used the same approach. The students were presented with a variety of topics they could study; they chose which one seemed most interesting. Our (Harvey Williams and my) students chose to work on energy drinks, something which many of them and their family and friends consume. Again, as a team, we developed a testable question, designed a model, developed and executed a protocol, analyzed the data and presented results. The process was guided by our unit plan and weekly lesson plans (e.g. 9/27/2010, 10/04/2010, 10/18/2010, 11/02/2010) and framed by a big picture.

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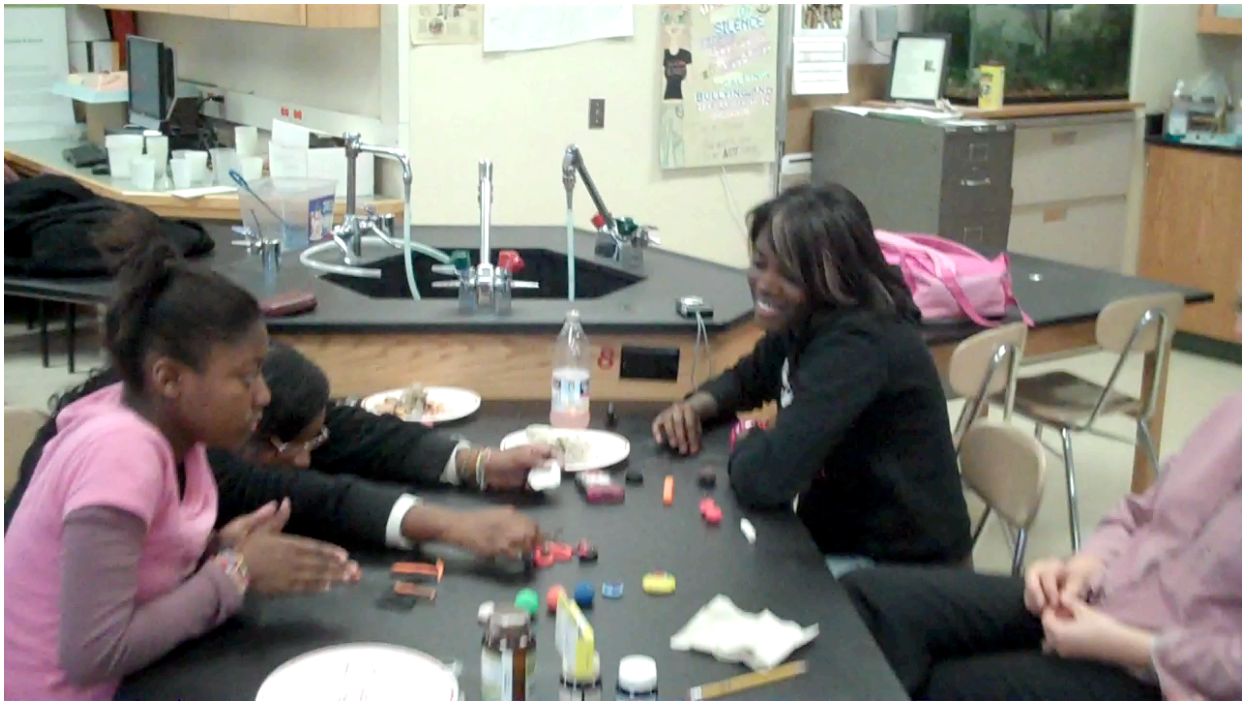
At STARS, we had the students build a model of their study out of clay and describe it (double click on picture and the movie will start):



The STARS also actively performed the research themselves, with their hands on the equipment, as evident in the pictures below:

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The above picture is one of my favorites because I remember the moment when she pushed the button on the Smart Board and the graph popped up. She was so amazed that she did it.

Again, the girls worked as a team, on an inquiry project relevant to their lives and co-constructed knowledge by testing their question, analyzing results and presenting their findings, all of which required effective

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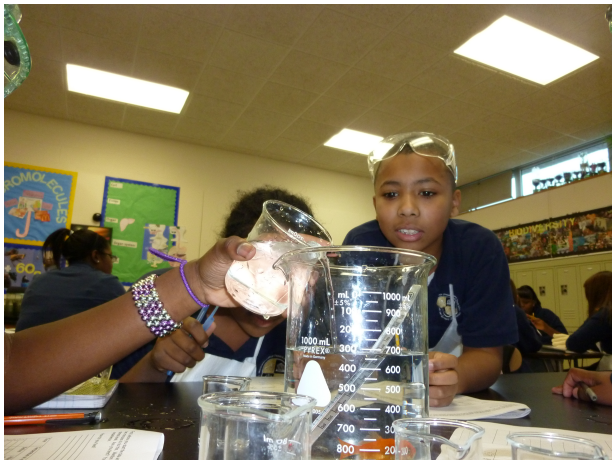
communication and deep thinking. The learned a lot about energy drinks, physiology, the nature of science and themselves.

In my first student teaching placement, at NorthWest College Prep, we completed 26 labs Between September and mid-January. This was excellent re-enforcement of my instinct and knowledge of theory that hands-on activities are the best way to learn. I saw our students engaged in many different hands on and inquiry activities and those class periods were, by far, the easiest to maintain student focus and the most interesting to teach. Follow up discussions to labs were generally on topic and the students readily volunteered correct answers. For example, after the homeostasis lab I wrote for my innovative series of three, in which the students were responsible for maintaining water temperature for a live fish within a narrow range while being forced to add hot or cold water to it, the students were very talkative. I had two goals for this lab: 1. I wanted the students to share the experience of a stress response (to feel the endocrine system in action) and 2. I wanted the students to understand how much work it is to maintain homeostasis. Below are some pictures of the endocrine/homeostasis lab. You can see how focussed they were on their task.



We discussed the experience after they finished the lab. They understood and discussed how much work it was to maintain the water temperature of the fish, and recognized

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that it would be too much for a human to have to consciously keep track of all the things we have to maintain. They recognized the need for autonomic systems to maintain homeostasis. Below, some student quotes demonstrate their understanding:

"If we had to do it [for ourselves] we would mess up."

"I think [our homeostasis] has to be automatic because we don't have enough time to make sure our bodies always stay at the right temperature without the automatic regulation, we would die."

"Because if you're constantly paying attention to your body and you couldn't do anything else."

The next day I used this new knowledge to begin a discussion of the endocrine system and present some content. Generally, after a day of slides and note taking, the discussion is less lively and less accurate than after a lab. I believe that note taking has its place, and that some material just needs to be presented. However, starting with analogies, examples, or big picture questions helps remind students that there is a reason we are learning what we are learning. Some days, the content is not connected to the big picture as well as others and I can watch the students zone out and become more easily distracted on those days.

Focus varies from class to class, and some content needs to be presented differently depending on where each class is. The amount of modification that needs to happen surprises me, but I have been able to make these adjustments from day to day, class to class with great success.

During this same placement, at North West College Preparatory High School (NWCP), I constantly related what we were studying to the student's lives. Whether this was discussing diabetes in relation to body systems, asking them about their own traits in genetics, or discussing the Rochester Public Market, I was very conscious of bringing in real life, and I think

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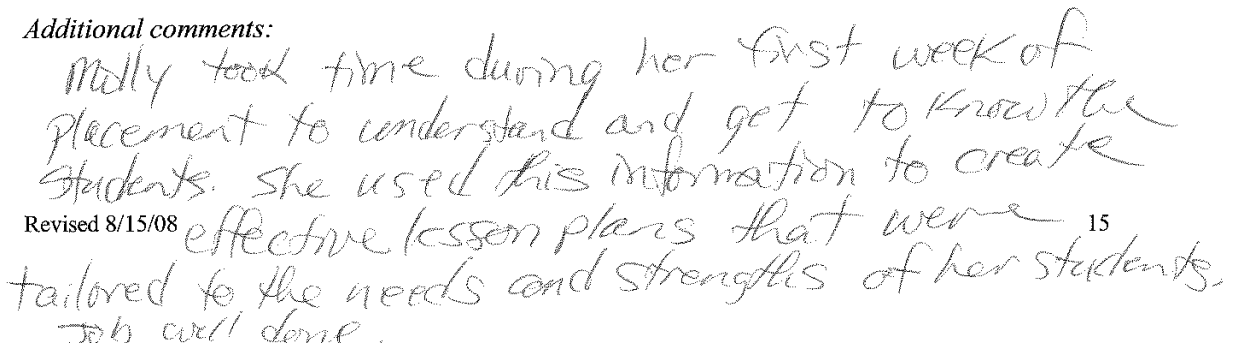
it helped. My co-operating teacher noted this ability in her evaluation at the end of my placement:

Molly has done much in the classroom to interest the students in science. For example, she has brought in elements of pop-culture to make science relevant for the students. Many of them have said that they enjoy seeing and hearing what they have learned at home in their every day lives.

Molly is familiar with the limits placed on students based on their socioeconomic status. She often bring in example that they are able to relate to based on their experiences and for that they are able to appreciate science that much more.

I continued this practice in my eight week placement at Rochester School of the Arts (SOTA). We had nearly daily journal entries followed by whole group discussions. This allowed me many opportunities to link the topic of the day or the bridge from the day before to their personal lives or mine. In addition to engaging the students with the content, it allowed me to get to know them on a more personal level. I believe that this connection is important for teachers to have with students in order to plan appropriate and relevant lessons for them. Peter Kalenda, my co-operating teacher, noted this in his evaluation:


Additional comments:
Molly took time during her first week of placement to understand and get to know the students. She used this information to create effective lesson plans that were tailored to the needs and strengths of her students. Job well done.
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My theoretical framework, which I operated within for the majority of the Get Real Science Program, describes my understanding of learning and pedagogy effectively. A prime example of my ability to apply my theoretical framework and understanding of learning can be found in the innovative unit analysis I wrote with my co-teacher, Theresa Milano in Lisa Buckshaw's class. (Lisa tells us this will be next years exemplar - we got a perfect score.)

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This unit plan exemplifies the model of teaching and learning I will follow in my career as an educator. I believe it is an effective model for all ages and can be modified to fit many ability levels.

3. Equity Principle

3.1. Candidates understand equity and social justice principles, including everyone's right to have an opportunity to learn and what constitutes equitable and socially just behavior and treatment for themselves and others.

and

3.3. Candidates are familiar with some of the cultural, linguistic and learning differences and/or disabilities their students may present and their implications for the classroom.

Everyone deserves the opportunity to earn a quality education. In the words of Wies and Dimitriadis (2008), "An increasingly pivotal point in the lives of youth, schools are increasingly becoming sites around which future opportunities spin." This is the same thought as their, "If school credentials do not 'guarantee' social mobility, they are certainly the sine qua non of such mobility in the New Economy" (p 2290). Yet, instead of increasing social mobility, "the data ... reveal that schools exacerbate initial disadvantages rather than reduce them" (p 2290). As I stated in the final paper for EDU 442, Race Class, Gender and Disabilities in American Schools, "Part of me feels like, 'I just want to be a teacher.' However, I recognize now that I can't "just" be a teacher without working on these continuing issues of inequality." My thoughts on race, class, gender and disabilities inequalities have evolved over the course of the Warner program, as evidenced but the paper mentioned above, and my initial personal narrative for the same class and my blogging.

These inequalities are evident for many categories - race, class, gender, sexual orientation, and disabilities among others. "Despite our nation's diversity, [race, class and

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gender] continue to be among the most significant social facts of people's lives" (Anderson and Collins, 2007). Despite apparent progress in many aspects of american life, race continues to be incredibly salient for many people. "Race matters, and as Smith insists, blackness matters in more detailed ways" (Ladson-Billings and Tate, 1995, p. 52) This is supported by data. "Even when we hold constant for class, middle-class African-American students do not achieve at the same level as their white counterparts" (Ladson-Billings and Tate, 1995, p. 51). The program at Warner has forced me to confront race in ways I never have before.

Racism is endemic in our society (Akom, A., 2008; Brayboy, B., 2005; Delgado Bernal, D., 2002; Guiterrez, K., 2005/2006; Johnson, L., 2002; Kumashiro, K.K., 2000; Ladson-Billings, G. & Tate, W.,1995; McIntosh, P., 2007; Mickelson, R.A. & Smith, S.S., 2007; Omi, M. & Winant, H., 2007; Schmidt, S. L., 2005; Tatum, 2001 and others), yet very few white people (myself included, prior to this program) acknowledge that they are racist. "Most oppression does not seem like oppression to the oppressor" Ladson-Billings and Tate, 1995, p 57). Another article that re-enforced this was, "White privilege: Unpacking the invisible knapsack" by McIntosh (2007). It made me think about all the things that I have been given that I have taken for granted. The list of the contents of the knapsack was particularly telling.

The idea of school as oppression is particularly new to me. From my final paper for EDU 442:

> Reading Friere's (2003) "Pedagogy of the Oppressed" made me wonder how much school was really oppressive for our students. It felt extreme to me. I certainly never felt oppressed, but as I have said in my identity paper, school was designed for me. We read a lot in our science education class, and in literacy learning as social practice class about how school really is that oppressive for many students. This is new to me. I generally thought school might be boring and irrelevant for some students, but not oppressive. I do not see it in my classroom at Northwest College Prep, but I followed a student around for a day

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> and could see in a few other classes, and certainly in the hallway how it could feel oppressive. The metal detectors that only place the students under suspicion and treat all adults as trustworthy really disturb me, and I do not have to walk through them. I can only imagine how humiliating it would be to be searched every day while teachers and other adults walk right past. That just sends such a terrible message.

The physical structure of schools, and the constant presence of sentries can feel oppressive, but so can the language of school. Gee (2004) cites language as one route through which schools oppress students. "Children will not identify with - they will even dis-identify with - teachers and schools that they perceive as hostile, alien or oppressive to their home-based identities" (Gee, 2004 p 36). He argues that educators need to recognize and validate students' natural language while apprenticing them to academic language, but that the current organization of schools is not amenable to this (Gee, 2004). "Schools tend to handle these problems by assessing the learner and then deciding for the learner how these problems ought to be dealt with" (Gee, 2004, p 61). A more validating way to proceed would be to let learners "assess themselves and learn things about what they do and do not know and what style of learning suits them here and now. Learners [can] then decide for themselves how they want to proceed" (Gee, 2004, p 61). I tried to do this by allowing students to produce reports/ final products in any form they wanted - so long as the required information was present. I received mostly standard PowerPoints™ and posters, but a few short stories, raps and comics.

This issue of language can be particularly important in science education, which operates with its own vocabulary. This can be intimidating to many students, particularly those who do not already speak in academic language. Lankshear and Knobel discuss this as a Discourse:

> "Discourses are socially recognized ways of using language (reading, writing, speaking, listening), gestures and other semiotics (images, sounds, graphics, signs, codes), as well as ways of thinking, believing, feeling, valuing, acting/doing

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> and interacting in relation to people and things, such that we can be identified and recognized as being a member of a socially meaningful group, or as playing a socially meaning role."

One approach to this is to create a classroom culture and lesson structure in which students can label issues and instruments with their own words, and then be guided to use the more scientifically correct diction after they have engaged with the material. In this way, I can draw upon and validate their existing knowledge and language, and take a step toward creating a "third space" (Maira and Soep, 2004).

> "To develop congruent third spaces for language, literacy, and science learning in diverse classrooms, four characteristics of classroom interaction seem necessary: (a) drawing from students' everyday Discourses and knowledges, (b) developing students' awareness of those various Discourses and knowledges (cf. New London Group, 1996), (c) connecting these everyday knowledges and Discourses with the science discourse genre of science classrooms and of the science community, and (d) negotiating understanding of both Discourses and knowledges so that they not only inform the other, but also merge to construct a new kind of discourse and knowledge" (Moje, 2001, p 489)

I touched on this in my theoretical framework.

> While discussing their investigations with the students, I will be cognizant of the socio-cultural/gender identity and the lens through which they see the world. While I can never actually see through that lens, I will do my best to incorporate their vision and prior knowledge into my lessons and discussions. I will acknowledge their thoughts and push them in the appropriate direction without criticizing them as a person. I will make my classroom a safe place to make mistakes and a safe place to view things differently from one's classmates. We will create a third space in which to construct scientific knowledge together (Driver et al. 1994). While many students in Brown (2006) talk about the hands-on nature of science and how that helps them understand the subject, almost none recognize themselves as scientists. This implies that a need for recognizing "students' discursive identity as an influential component of their performance in science classrooms" (121). While word choice matters for teaching and learning the nature of science (Schwartz, 2007), the language of science is also the main reason sited in Brown (2006) for students' not identifying with science. By allowing students to describe things in their own words first and then giving them the appropriate terms, hopefully understanding will precede dissociation due to language barriers. For instance, by co-constructing a list of processes required for life before labeling the organelles in a cell that carry out those functions.

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Language can also be very important when working with students with disabilities. In my final paper for Disabilities and Schools, EDU 447 I investigated the history of education of deaf students. Included was a discussion of pros and cons of educating deaf students in inclusion settings versus deaf classrooms/schools. Deaf students in particular can have difficulties with our very verbal/auditory form of communication. Lack of communication can have ramifications beyond just interacting with other people. It can affect cognitive abilities:

> Ramsey (1997) argues that the best way to assist deaf students is to use natural human language that is signed, not spoken. Social interactions are how children usually learn language. It is the most natural, easiest way. This is important because denying a child early communication may also deny them future cognitive abilities. Ramsey (1997) believes higher mental functions - the cognitive and symbolic abilities and the strategies for learning that we expect children to acquire in school - originate as relations between people. "At least one source of the consistent problems deaf children experience at school may not be their inadequate English proficiency or their hearing deficit but a more profound lack of access to a fully elaborated, culturally living symbol system that they can exploit to further their activities with the world and with other people" (Ramsey 1997).

My interest in deaf education began with an interview that I completed for the same class, and the paper that I wrote about the interview. During my eight week placement, I had a deaf student in one class and we effectively modified many lessons for her. I will describe that in under Warner Principal 3.4. She maintained an A average and regularly contributed to the class discussions.

In Disability and Schools I also learned how to read Individual Education Plans, how to implement modifications, and about the process through which they are developed. My co-teacher for my eight week placement is also working toward an inclusion certification. This ensured I was aware of modifications that we needed to make for our various special education students. As a part of EDU 447, I also wrote a paper on The Short Bus. The book discusses the problems our society has accepting children with special needs, and the

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emotional and educational impacts that this can have on the students. We wrote a lot of blog postings about this, but they have, unfortunately been taken down from BlackBoard and I did not save copies.

In addition to language, the curriculum itself needs to incorporate and validate students existing knowledge and culture. I will be teaching adolescent students. Adolescents is a time of identity formation (Erikson, 1968). During this period, young people become more aware of their various identities, particularly of race (Sawdowski, 2005). With this in mind it is important to acknowledge and discuss differences, allowing students to explore their identities in a positive environment, rather than ignore the issues, and through passiveness, condone existing biases in the school environment (Sawdowski, 2005). Included in creating a positive space to explore racial identity is offering more examples of achieving blacks/hispanics/asians in history and giving students more role models than just Martin Luther King. This applies not just to students' racial identities, but also their sexual, gender, class and dis/ability identities (Sawdowski, 2005).

I understand equity and social justice issues and that they are not being effectively dealt with in schools today. I have wrestled with understanding my own identity in EDU 442 and have been conscientious of my own identity and those of my students during my students teaching. In EDU 442 we were forced to acknowledge that as whites we have contributed to the oppression of others whether we are actively racist/classist/sexist or not. I have gained opportunities through my identities of privilege. Simultaneously, I have had to make choices that I would not have had to make if I were male. While I never felt directly discriminated against, where I am in life now, (not using my Master of Sciece degree or finishing my PhD) is largely a result of being female. I have learned to recognize my identities through a hierarchy

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of power, acknowledge them, and recognize that everyone also has several identities that need to be acknowledged and appreciated within society, and particularly within the classroom. I will demonstrate how I have used this consciousness under Warner Principal 3.4.

3.2. Candidates are committed to high moral and ethical standards and respect and value their students' differences in contexts and approaches to learning.

I am committed to high moral and ethical standards and respect and value my students' differences in contexts and approaches to learning. This is evident in my lesson planning as demonstrated below in section 3.4. It is also evident in writing assignments that I have completed in other classes. Namely, my final paper for EDU 415. In this paper I present my basic thesis that everyone is an individual, not just a collection of categories (Sawdowski, 2005). We need to treat them as such, whether they are five years old or fifteen or sixty. We need to treat everyone fairly and equally, but that does not mean identically.

My ability to behave with high moral and ethical standards is described in the following quote by Lawanda Brown, my 4 week placement co-operating teacher,

> "My students, (8th to 12th graders) connected with her and enjoyed having her in class. Molly greeted the students each day with a smile. Many of them noted that she was of the same temperament every day. She never treated a child differently based on their behavior, grade, lack of interest or otherwise. "

3.4. Candidates are able to provide learning experiences that are culturally relevant and address the strengths and needs of all students.

I understand that, as a teacher, I play an important role in validating individuals within the school context, regardless of learning style. I make my lessons accessible to all students by using multiple modalities of communication - writing, reading, saying, listening and doing. By creating as many hands on learning activities as possible, I engage both traditional learners and those with alternative learning styles. Hands on learning experiences engage all students.

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I discussed some hands on activities that I have designed and taught in the "Learning" section of the document.

I considered how to make content accessible to all students in all of my lessons. A few examples stand out: the endocrine series of three, acting out mitosis, and the evolution unit - especially the stations and the media project. All of these lessons included group work, problem solving that built on the students existing knowledge, open ended questions and discussions in both small and large groups.

The endocrine series of three engaged students that were not usually engaged. Of 42 students who participated over two periods, only 5 seemed less than completely engaged. the main point of the lesson became clear to the students without being explicitly stated. During the wrap up discussion, I asked, "Humans have automatic regulation systems that keep their bodies alive. Why do you think these systems need to be automatic?" Lexus, who rarely spoke in class raised her hand with the answer, "If we had to do it ourselves, we'd be constantly taking our coats on and off and we wouldn't be able to do anything else." I also believe that this lab was successful in overcoming some cultural differences in the class by giving the students a shared experience to discuss. You can read more student comments and see pictures of how engaged the students were in my series of three investigation presentation.

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My observations and evaluations reflect my consideration of equity. In response to the lesson on mitosis, Sue Wyand wrote:

3. EQUITY PRINCIPLE *The teacher candidate understands how students differ in their approaches to learning and creates instructional opportunities that are adapted to diverse learners. The teacher understands the role each of us plays in the maintenance and transformation of social and educational practices that engender inequity and is committed to promote equity and social justice.*
Your lesson had a little bit of something for each student. They appeared to like the finding of their partner DNA and work with each other to walk through the stages of mitosis. This allowed the students to interact with classmates in a non threatening manner to reinforce a key concept. Your classroom is a safe place that honors all learners as evidenced by students willingness to share their thoughts from journals or volunteer to answer questions as part of a discussion.

Your lesson had a little bit of something for each student. They appeared to like the finding of their

The evolution stations garnered the following reviews:

Sue Wyand:

3. EQUITY PRINCIPLE *The teacher candidate understands how students differ in their approaches to learning and creates instructional opportunities that are adapted to diverse learners. The teacher understands the role each of us plays in the maintenance and transformation of social and educational practices that engender inequity and is committed to promote equity and social justice.*
Your varied activities and cooperative work addressed the needs of the students in the class. The four stations tapped into some part of the students learning needs. Information was provided in multiple formats so students could synthesize new information by the end of the 2 class session.

JoAnn Morrealle:

3. EQUITY PRINCIPLE *The teacher candidate understands how students differ in their approaches to learning and creates instructional opportunities that are adapted to diverse learners. The teacher understands the role each of us plays in the maintenance and transformation of social and educational practices that engender inequity and is committed to promote equity and social justice.*

All students were treated fairly. Accommodations were made according to student IEP's. There was variety in the work process and opportunity for multiple "right" answers in the product.

On his final evaluation of my eight week placement, my CT, Peter Kalenda, wrote the following:

Proficiency:	***n/o***	***1***	***2***	***3***	***4***
3.1. Candidates understand equity and social justice principles, including everyone's right to have an opportunity to learn and what constitutes equitable and socially just behavior and treatment for themselves and others.					X
3.2. Candidates are committed to high moral and ethical standards and respect and value their students' differences in contexts and approaches to learning.					X
3.3. Candidates are familiar with some of the cultural, linguistic and learning differences and/or disabilities their students may present and their implications for the classroom.					X
3.4. Candidates are able to provide learning experiences that are culturally relevant and address the strengths and needs of all students.				X	

Additional comments:
Molly had a clear understanding of urban student needs during her placement. She also excelled at teaching and planning lessons for students w/ special needs.

4. PEDAGOGY PRINCIPLE

Combined, my proficiency scores in this area are as follows:

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Proficiency:	*n/o*	*1*	*2*	*3*	*4*
3.1. Candidates understand equity and social justice principles, including everyone's right to have an opportunity to learn and what constitutes equitable and socially just behavior and treatment for themselves and others.					4
3.2. Candidates are committed to high moral and ethical standards and respect and value their students' differences in contexts and approaches to learning.					4
3.3. Candidates are familiar with some of the cultural, linguistic and learning differences and/or disabilities their students may present and their implications for the classroom.					4
3.4. Candidates are able to provide learning experiences that are culturally relevant and address the strengths and needs of all students.				3.8	

When designing our evolution unit, Theresa and I aligned it carefully with both the NSTA standards and our theoretical framework. Our theoretical framework includes the idea that science should be accessible for all students and that inquiry and group work is an effective way to achieve that. One advantage to inquiry based lessons is that they naturally support differentiation among students (Scruggs, Mastropieri, & Okolo, 2008). This was true in our unit. The stations were differentiated in that they had hands on activities, drawing, writing, visual and auditory segments. Also, the students worked in groups, so their natural inclinations could complement each other. Encouraging students to have small group discussions, having near daily journalling followed by large group share outs and discussions, and asking many open ended questions helps to validate students' experiences and communication.

Specifically journalling enabled students to share their struggles with the conflict between evolution and their beliefs. It allowed them to ask questions that we did not have time to address in class. It also allowed one student to communicate her frustrations with the class

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culture. Her class was very difficult for us to control, even with four teachers in the room, and she was new to the class. You can see from our responses that we gave them thoughtful, written feedback.

In our unit analysis paper, we discuss how our lessons aligned with our theoretical framework. In particular, in terms of equity:

> While discussing their investigations with the students, we were cognizant of the socio-cultural/gender identity and the lens through which they see the world. Students worked in small groups throughout the unit, which allows space to ask questions and have discussions without the pressure of speaking to the entire class. When we did share with the entire class, students treated each other as well as us with respect. We effectively created a third space in which to construct scientific knowledge together (Driver et al. 1994). This was evident in the students willingness to share after journaling about natural selection and Darwin's theories versus their own, in think/pair/shares during the slide presentations, and in the presentations of the media projects. Students also worked effectively and collaboratively in the stations and time-line activities.

The media project was designed to let them use their existing computer skills and creativity to demonstrate their learning about evolution. By letting them choose their own topic (from a list) and then finding their own examples for the media project, we gave them space to make the subject relevant to their own lives. For example, many of those working on artificial selection talked about domestic dogs.

Another example of how we validated students perspectives is in asking them questions about how they deal with conflict. One of the stations was about Darwin's struggles with the conflict between society, his original beliefs, and his findings on his journey on the Beagle. Then they answered questions about how they would have approached the conflict if they were Darwin, placing them in various situations. To related it to their own lives we asked if they had experienced any conflict between their beliefs and society's.

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Multimodal assessments offered varied learners opportunities to express what they have learned in a way that works best for them. Our lessons were effective for everyone in the class. In particular we followed three students. From our unit analysis paper:

> Even though not all students completed every assignment, all students completed some assignments. This offered us the opportunity to evaluate every student's understanding of the subject. Our multiple forms of assessment allowed students to show us in a way that they felt most competent whether they learned what we wanted them to learn. In addition, all students took the quiz. That was strong evidence of understanding of the process of natural selection.
>
> The claims made above can be evidenced through looking at three specific students. We chose to follow Yolie, Caz and Jessica. Yolie is a high achiever who has a hearing impairment. Her IEP accommodations include having a notetaker, an interpreter to translate for her, as well as a separate location for test taking. Yolie is always happy and excited to come to class (except on quiz days), and although her IEP also contains goals to foster friendship making, she does have a few classmates she usually associates with. Caz is a medium to high achiever who is diagnosed with emotional disturbance. His IEP accommodations include extra time on tests as well as advanced notice of transitions before they occur. Caz often arrives to class early. While sometimes the various assignments seem overwhelming to him, if an instructor calmly sits down and works with him on the material, he does very well on the task. Finally, Jessica is a medium to low achiever who does not have a disability label. Jessica is very good at asking for help if she needs it; however, towards the end of our unit, she started to socialize more and more during class. Despite repeated attempts include her back in the lesson, there were frequent side conversations that involved her. However, she is generally well liked by her peers.
>
> The attached table shows all of the major assignments given during the lesson and the students' scores (converted to be out of 100, and rounded to the nearest digit) on each assignment. Caz's scores show that, with one or two exceptions, he did very well during this unit, mostly above his average for the previous assignments. Because of this, Caz's average score improved during this unit. Jessica's scores represent a roller coaster where some assignments were very well done and some were not. Her overall score (once everything was weighted and averaged), though, did improve through this unit. Yolie's grades show her continual high achievement, with almost perfect scores across the board. She was particularly proud of her perfect score on her evolution quiz as quizzes had been her weak point previously during the year and this represents a very great job on her part. Her average score, as well, improved during the unit.

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Through effective lesson planning (inquiry, differentiation and hands on work) we were able to effectively teach all of our students, regardless of dis/abilities, socio-economic status, race or ethnicity.

In addition, I have considered the role of gender in science education in depth in STARS unit planning and analysis and in my Adolescent Development and Youth culture class. This is demonstrated in the intereviews, resource guide and presentation/discussion I completed with Theresa Milano for the same class.

4. Pedagogy Standards

NSTA standards:	***1***	***3***	***4***
5.a Candidates vary their teaching actions, strategies, and methods to promote the development of multiple student skills and levels of understanding.			
5.c Candidates successfully organize and engage students in collaborative learning using different student group learning strategies.			
5.d Candidates successfully use technological tools, including but not limited to computer technology, to access resources, collect and process data, and facilitate the learning of science.			
6.a Candidates understand the curricular recommendations of the National Science Education Standards, and can identify, access, and/or create resources and activities for science education that are consistent with the standards.			

Warner 4.1 Candidates are familiar with a wide array of instructional strategies consistent with professional, New York State and Warner School programs standards, and understand their potential uses, values and limitations for achieving specific learning goals.

Warner 4.2 Candidates are able to use a variety of teaching and learning strategies and classroom structures to achieve the learning goals articulated in relevant professional, New York State and Warner School program standards.

Like critical science education theorists (Fusco and Barton, 2001), I believe that scientific literacy is empowering and should be available to all people. To ensure this, I used a

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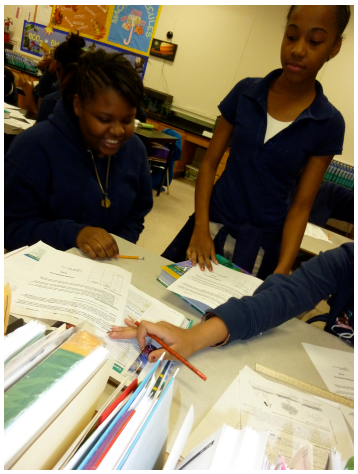
variety of teaching methods throughout my placements. Varying pedagogical methods allows multiple access methods to students with affinities for different kinds of learning.

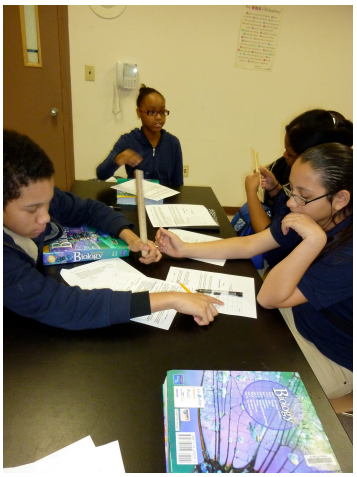
From my theoretical framework:

> The most effective way to teach the nature of science is by doing inquiry based lessons (Lederman, 1992). One advantage to inquiry based lessons is that they naturally support differentiation among students (Scruggs, Mastropieri, & Okolo, 2008) Widschitl (2008) offers a simple framework of conversations with which to approach teaching inquiry, and stresses the importance of using inquiry projects that incorporate the content we want the students to learn. Inquiry projects should relate to scientific content at the very least (Trefil, J and O'brien-Trefil, 2009). At their best, inquiry projects also relate to the students lives.

I followed this in my teaching. In both of my placements I used as many instructional strategies as possible: independent reading, group problem solving, hands on activities, power point presentations, and research projects with presentations. Lessons that I designed from scratch began with an inquiry activity. I often modified lessons that were suggested by my co-operating teachers to move them up the inquiry scale.

In my four week placement the students worked in groups several times a week (NSTA 5.c). As seen below:





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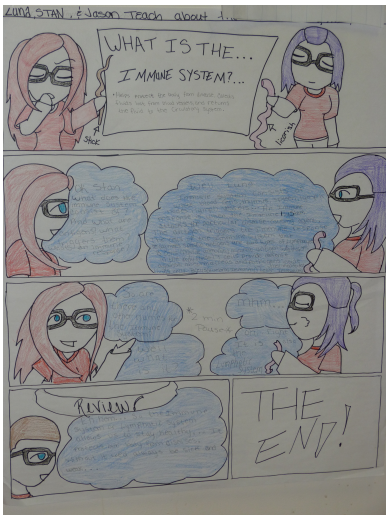
In these two pictures, the students are engaged in an experiment on reaction time and how it varies between vision, hearing and touch. In the following picture, students are researching literature on a body system to make a poster and present their findings.

Some students used this opportunity to write a rap (double click on the bottom left picture on this page to hear it.), and others made a comic strip.



I continued this in my eight week placement. The group work created a collaborative classroom environment, made learning more fun, and gave the students ownership of their learning. Group work is also important so students can co-construct knowledge. “Students bring to a learning experience their current explanations, attitudes, and abilities. Through meaningful interaction with their environment, with their teachers, and among themselves, they reorganize, redefine, and replace their initial explanations, attitudes and abilities” (NRC et al., 2000).

Along with all of this group work and writing, in both placements I incorporated guided readings. Many of these students are below grade level in reading, so they need the practice. Reading also offers yet another way for learners to approach the material (NSTA 5.a).

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As a large group task (NSTA 5.c), in both placements my students acted out mitosis using pipe cleaner chromosomes. This allowed the students to get up and move around, working together to remember where to go in each stage enabled kinesthetic learners to create muscle memories of the process. From my observation by Sue Wyand that day:

> "Your lesson took into consideration the varied learning needs of the students in your class. You varied the activities to tap into different learning styles. Your plan involved auditory, visual and tactile components. You asked the students to journal and reflect on yesterday's lesson. This springboard allowed the students to make connections regarding the concepts they were learning. You asked the students to act out phases of mitosis. Students were talking among themselves to make sure classmates understood where they were supposed to stand in each phase. Your cues allowed students to see the name of the phase with the action of the DNA."

The prior day's lesson began with the journal question, "What is the most important thing an organism needs to give its offspring for it to be born." This created a dynamic classroom discussion of heredity and DNA, which was followed by an independent activity in which they drew the phases of mitosis from a power point model of the process. The day of this lesson began with a journal entry asking students, "If you get half of your DNA from your mom and half from your dad, why don't you have twice as much DNA as they do?" Again, this created a dynamic discussion of cell replication with the students that allowed us to introduce the concept of meiosis. We watched videos to review the mitosis from the day before, then asked the students to act it out. This was wrapped up with a brief powerpoint about mitosis versus meiosis. So, this set of two lessons on cell reproduction incorporated independent modeling, watching video models, personal reflection, large group discussion, direct instruction with power point, and kinesthetic learning (NSTA 5.a).

This variety of pedagogical methods is also evident in my evolution unit, discussed earlier under content. We opened with two days of hands on, small group mediated inquiry

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stations. This was followed by independent, reflective writing, direct instruction by me, more independent reflection and think/pair/share. Then the students worked in groups to research an important figure and create a live action timeline. As a wrap for the week, students watched a Bill Nye movie on evolution (NSTA 4.4, NSTA 5.d). The following week they worked in pairs to research a topic in evolution using the internet, and created a media presentation (NSTA 4.4, NSTA 5.d). Some students wrote stories, some made comic strips, some performed songs, most made power point presentations.

We asked the students to reflect on their learning throughout each unit. Metacognitive reflection can be used to help students remain focused on the point of the unit and the unit activities (Oakes and Lipton, 2007). As Dewey (1933) said, “We do not learn from experience... We learn from reflecting on experience.” With this in mind, we asked students to reflect in their journals nearly daily, as well as summatively on the final exam of the unit. One of the daily reflections involved comparing their thoughts about some data to Darwin’s thoughts about the same data, and considering how each of their thoughts had evolved. This effectively created a space for students to express issues that they were struggling with. We responded

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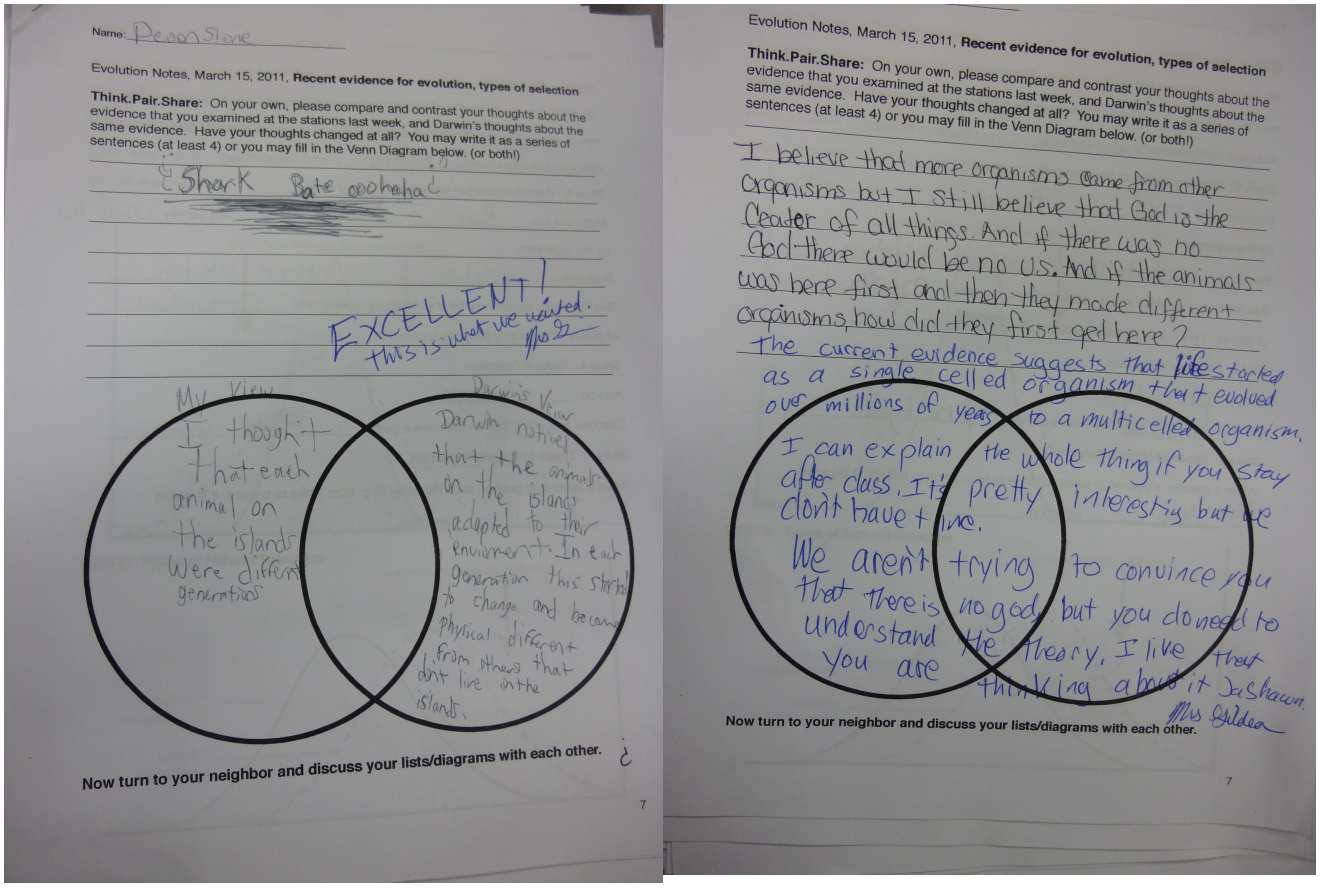

Name: Deon Stone

Evolution Notes, March 15, 2011, **Recent evidence for evolution, types of selection**

Think.Pair.Share: On your own, please compare and contrast your thoughts about the evidence that you examined at the stations last week, and Darwin's thoughts about the same evidence. Have your thoughts changed at all? You may write it as a series of sentences (at least 4) or you may fill in the Venn Diagram below. (or both!)

Shark Bate ooohaha

EXCELLENT! this is what we wanted. Mrs D

My View: I thought that each animal on the islands were different generations

Darwin's View: Darwin noticed that the animals on the islands adapted to their environment. In each generation this started to change and became physical different from others that don't live on the islands.

Now turn to your neighbor and discuss your lists/diagrams with each other.

7

Evolution Notes, March 15, 2011, **Recent evidence for evolution, types of selection**

Think.Pair.Share: On your own, please compare and contrast your thoughts about the evidence that you examined at the stations last week, and Darwin's thoughts about the same evidence. Have your thoughts changed at all? You may write it as a series of sentences (at least 4) or you may fill in the Venn Diagram below. (or both!)

I believe that more organisms came from other organisms but I still believe that God is the Creator of all things. And if there was no God there would be no U.S. And if the animals was here first and then they made different organisms, how did they first get here? The current evidence suggests that life started as a single celled organism that evolved over millions of years to a multicelled organism. I can explain the whole thing if you stay after class. It's pretty interesting but we don't have time. We aren't trying to convince you that there is no god but you do need to understand the theory. I like that you are thinking about it. Jashawn. Mrs Gildea

Now turn to your neighbor and discuss your lists/diagrams with each other.

7

to their entries as best we could. It also exposed some misconceptions of the material, and

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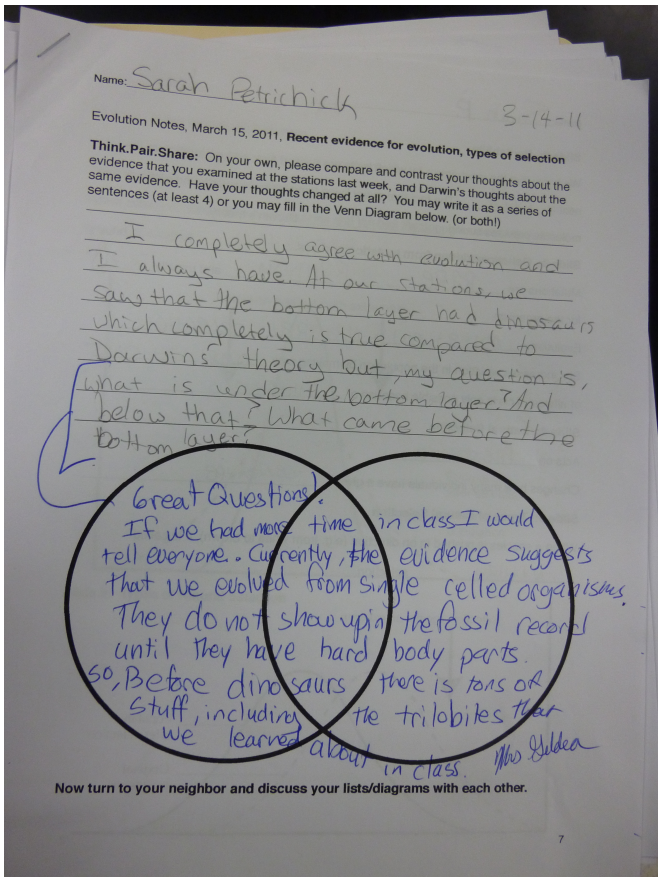
allowed us to correct them in subsequent lessons.


Name: Sarah Petrichick 3-14-11

Evolution Notes, March 15, 2011, **Recent evidence for evolution, types of selection**

Think.Pair.Share: On your own, please compare and contrast your thoughts about the evidence that you examined at the stations last week, and Darwin's thoughts about the same evidence. Have your thoughts changed at all? You may write it as a series of sentences (at least 4) or you may fill in the Venn Diagram below. (or both!)

I completely agree with evolution and I always have. At our stations, we saw that the bottom layer had dinosaurs which completely is true compared to Darwins theory but, my question is, what is under the bottom layer? And below that? What came before the bottom layer?

Great Questions! If we had more time in class I would tell everyone. Currently, the evidence suggests that we evolved from single celled organisms. They do not show up in the fossil record until they have hard body parts. So, Before dinosaurs there is tons of stuff, including the trilobites that we learned about in class. Miss Baldea

Now turn to your neighbor and discuss your lists/diagrams with each other.

All of these lessons, and units were designed backwards from the New York State and National Science Education Standards following the recommendations of Wiggins and McTighe (2005). From the standards, we would distill the goals and objectives. We distilled down these goals and objectives to one "big idea" (Wiggins and McTighe, 2005). (NSTA 6.a) This is important because

> "Experts first seek to develop an understanding of problems, and this often involves thinking in terms of core concepts or big ideas. Novices' knowledge is much less likely to be organized around big ideas; novices are more likely to approach problems by searching for correct formulas and pat answers that fit their everyday intuitions" (Bransford, Brown and Cocking, 2000 p 49 as cited in Wiggins and McTighe, 2005, p 65)

For our evolution unit, we hung a big sign with the essential question, "How did we get where we are?" The "big idea" was expanded from that to

> "We will approach our essential question from two views. First, how did we come to our current understanding of the theory of evolution? Many scientists contributed to our current understanding. Even before Darwin, the theory was being built. Second, how did we, physically become who we are? All current life forms evolved from a single celled organism that has gone through innumerable speciation events over millions of years. Each day students will consider this question and how it applies to the days lesson."

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We referred back to this essential question and big idea in each lesson to remind students where to hang their new information on the larger concept of evolution, as well as the nature of science.

While the evolution unit is my most conspicuous use of backward planning, I used it for every unit and lesson from STARS through my endocrine unit in my 4 week placement, and into all our lessons at our eight week placement (NSTA 6.a). In our eight week placement, we made sure to link the genetics, cell reproduction and evolution units together by asking a lot of questions about how they were inter-related, and explicitly stating the relationships when necessary.

Warner 4.3 Candidates understand the potential values as well as problems and limitations of using technology in instruction.

Warner 4.4 Candidates are able to use technology in a variety of ways to support student learning within specific content areas.

Beginning the media project, we asked the librarian to suggest to the students where to find reliable information. This independent project gave the students independence and ownership, but was also scaffolded (by our presence and critique of students' ability to find useful information.) This is an important skill: "...using the internet to locate relevant information and discrimination between useful and non-useful information" (Flick and Bell, 2000).

In my eight week placement I used a smart board on a regular basis. We used it to present slides, show movies, and create interactive games for the students to play. We also created a wiki site on which the AP environmental science students submitted writing and had discussions. This was possible because we had a laptop cart. One day I introduced them to Google Docs, but it turned into a bit of a disaster with everyone's cursers writing over each

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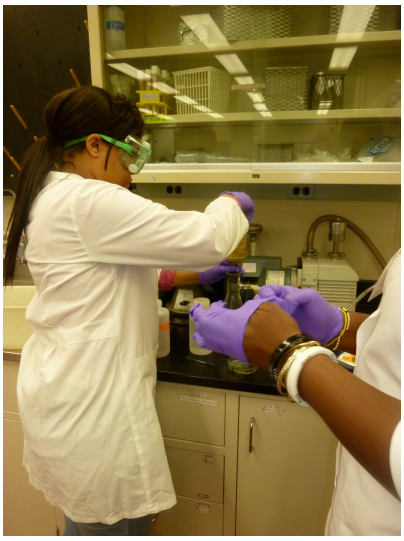
others' writing. Without sufficient planning and consideration, technology can serve as merely a distraction, and not add anything to a lesson. As Flick and Bell (2000) point out, "novelty and sophistication of modern technologies might distract or even mislead students in understanding science concepts that are the target of instruction."

However, using technology in the classroom also links science and technology in students' minds. "...technology as knowledge (not necessarily scientific technology) applied to manipulate the natural world and emphasizes the interactions between science and technology" (Flick and Bell, 2000). (NSTA 5.d) I have used technology in every teaching situation I have been in. In camp, we used appropriate technology to collect and analyzed data. For instance, we used Vernier probes to collect data on water temperature and turbidity. We measured distances using a measuring tape. To culture and identify bacteria of interest in the water, we used Coliscan(tm) Easygel media. The campers wanted to quantify the amount of algae in the water, so I designed a protocol that dried the algae sample using a filter and air pump (with the help of the lab manager at the University of Rochester Biology Department, Bev Mihalenko). The pictures to the right are of students using this apparatus. The campers were as excited to be in the lab as



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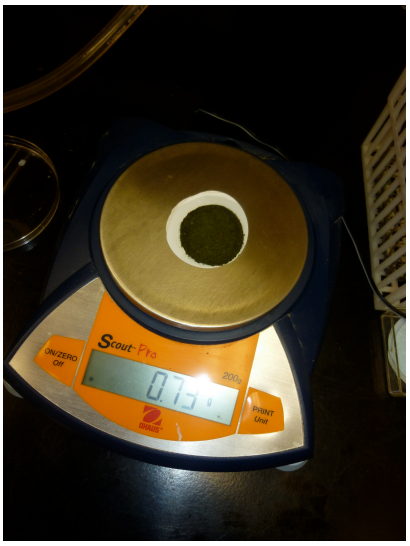

they were to collect data in the field. Using appropriate technology made them feel like scientists, which is an important part of our task as science educators.

Students today exist in a very different world than the one their teachers and parents grew up in. “Space is typically thought of as enclosed as having borders. ...learners who have grown up on the inside of a cyberspatial mindset often see things very differently and approach them very differently” (Lankshear and Knobel, 2006). I keep this in mind when I am teaching and allow my students to explore the world as they see it, not force them to see it as I do.

In Literacy Learning as Social Practice, we engaged with a lot of Web 2.0 practices and discussed possible ways we could use them in the classroom. I did three Web 2.0 projects: geocaching, YouTube, and wikis. Each of these projects enabled me to consider classroom uses as well as possible limitations.

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5. Learning Community Principle

NSTA standards:	*1*	*3*	*4*
5.f Candidates create and maintain a psychologically and socially safe and supportive learning environment.			
9.a Candidates understand the legal and ethical responsibilities of science teachers for the welfare of their students, the proper treatment of animals, and the maintenance and disposal of materials.			
9.b Candidates know and practice safe and proper techniques for the preparation, storage, dispensing, supervision, and disposal of all materials used in science instruction.			
9.c Candidates know and follow emergency procedures, maintain safety equipment, and ensure safety procedures appropriate for the activities and abilities of students.			
9.d Candidates treat all living organisms used in the classroom or found in the field in a safe, humane, and ethical manner and respect legal restrictions on their collection, keeping and use.			

5.1. Candidates understand what may encourage or hinder student's motivation and engagement in learning, based on an analysis of research and practice.

Many students feel disconnected from science, or feel it is not possible for them to maintain their culture and be a scientist (Barton and Yang, 1998 and Lee, 1997). As Moje (2001) describes, multiple discourses come into contact in science courses, and sometimes they conflict. This implies a need for recognizing "students' discursive identity as an influential component of their performance in science classrooms" (Brown, 2006, p 121). Teachers need to create a "third space" where the conflicting discourses are no longer seen in conflict.

> "The aim, in this elusive third space, is not for students to achieve fluency in the teacher's privileged academic discourse but for all participants in a learning encounter to rescript (or unscript) their interactions within a 'responsive and collaborative environment where youth culture is recognized as itself a site and resource for knowledge production" (Maira and Soep 2004, p 257).

The language of science is one of the reasons often cited for students not identifying with science (Brown 2006). Educators need to recognize and validate alternative forms of communication while simultaneously helping the students learn academic language.

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Small group projects can assist in this approach by allowing students to describe things in a low pressure environment. By offering inquiry problems for small groups, or the whole class to solve, we can help students overcome their inhibitions and take ownership of their projects. This can result in very positive outcomes for more than just their science learning. E.g. students say things like, “I learned more than just chemistry. I learned about who I am and what I have to offer” (Gallagher-Bolos and Smithenry, 2008, p 44).

Helping the students find internal motivation to solve the problems in a significant hurdle and goal for educators. However, when the internal motivation is difficult to access, “...knowing how to promote more active and volitional (versus passive and controlling) forms of extrinsic motivation becomes an essential strategy for successful teaching” (Ryan and Deci, 2000 p 55).

According to Ryan and Deci (2000) the way to get to internal motivation for learning is to provide three basic human needs. In their words,

> “...In schools, the facilitation of more self-determined learning requires classroom conditions that allow satisfaction of these three basic human needs- that is that support the innate needs to feel connected, effective, and agentic as one is exposed to new ideas and exercises new skills” (Ryan and Deci, 2000, p 65).

I believe that schools have a lot to learn from from successful youth based organizations.

> “In most YBOs, a meeting takes place at least once a week that opens with adults or older members asking, “Okay, how’s it goin’? Any rules we need to change? Any thoughts on how the teams are workin’?” (Heath 2004, p52)

These questions engage the youths as full participants in the project, and show that the adults care about them as people. They are allowed to construct the working environment with the adults and identify rules that matter to keep the environment functioning and welcoming. “The overarching ethic of operation for all of these YBOs derives from seeing youth as resources and not as problems” (Heath 2004, p 50). In class we can employ this ethic by creating

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opportunities for the students to share their talents and knowledge with the class. Being explicit with the students about our purpose, we can ask for ideas of how best to use them as resources. However, we should not let them always stay in their comfort zone. The most effective after school programs are those that, "provide [adolescents] with an opportunity to pivot and reinvest vital psychic energy" rather than an opportunity to stop and reflect (Nakkula, 2008, pg 16).

5.2. Candidates are able to construct comfortable and safe classroom environments for all students. (NSTA 9.a, 9.b, 9.c, 9.d)

In my eight week placement, Theresa or I always greeted our students at the door with a smile. This is mentioned in a few of my observations. This was also true in my four week placement. In my CT, Lawanda Brown's words, "My students, (8th to 12th graders) connected with her and enjoyed having her in class. Molly greeted the students each day with a smile. Many of them noted that she was of the same temperament every day."

I have considered the necessity of creating a physically safe environment and respecting the animals that we use in class, please see my safety audit essay. Safety is the most important priority in any classroom. In science classrooms, therefore it is imperative that both the teacher and students understand both how to avoid accidents and what to do should one happen. To this end, I completed safety audits for myself at the beginning of each placement. I intend to complete these at the beginning of each teaching year. They will serve as a reminder of my ethical and legal obligations to keep my students, and the school in general safe.

5.3. Candidates are able to construct a classroom environment that supports student motivation and learning and the creation of a "community of learners." (NSTA 5.f)

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"Deep learning works better as a cultural process than it does as an instructed process" (Gee 2004). With that in mind, almost all of my lessons have involved small group work and whole class discussions. This started at GRS Camp, and continued through STARS. I maintained the practice in the more formal school settings without any problems.

In addition to the previously mentioned group work of the series of three, acting out mitosis, evolution stations, and media project, I carried out several other lessons involving small group work in which the students could co-construct their knowledge. During our genetics unit in my eight week placement, we had the students complete a "smiley face" lab. The first day they worked independently to create their "baby" and the next day they worked with two or three other people. They created Punnet Squares and compared the ratios of traits in their population to the expected results from Punnet Squares. Through this process they learned about probability in general, and the chance involved in becoming who we are - basic genetic concepts. They also had a lot of fun drawing and then comparing their babies.

We introduced and followed up on this lesson with journal entries and whole group share outs/discussions about genetics. Throughout this genetics unit we had the students answer journal questions and then discuss their answers in an open and friendly forum. These discussions created lively commentary and projections between students, as well as gave us,

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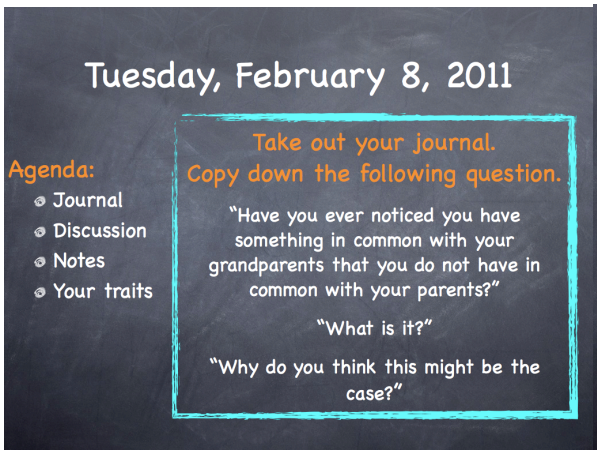
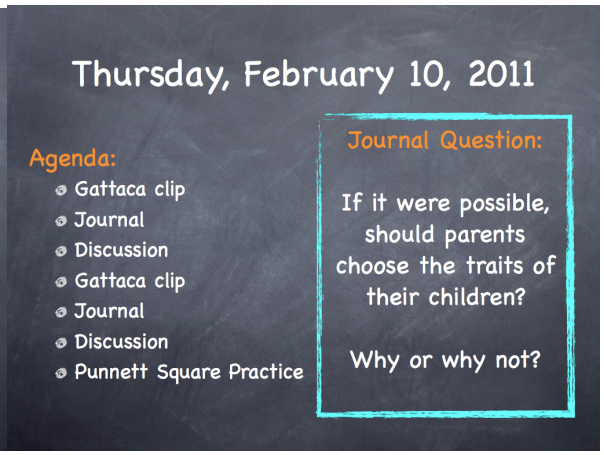
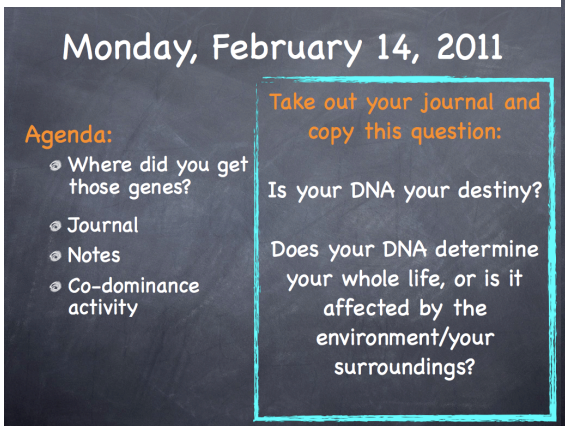
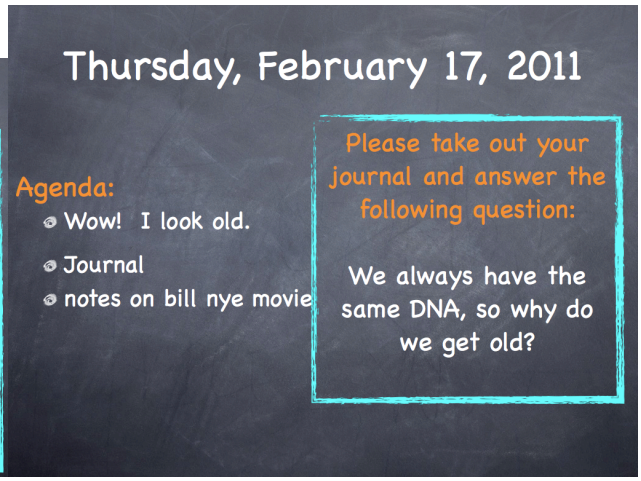
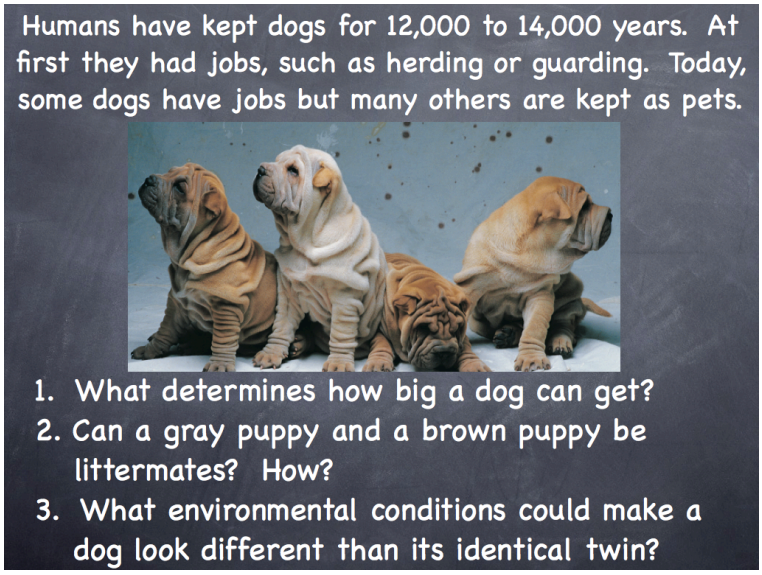
as teachers, insight into our students world perspective and their understanding of the material at hand. A few sample journal questions follow:











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Unfortunately I do not have samples of the students' journals, but I do have some quotes from my Co-operating teacher, Peter Kalenda

5. LEARNING COMMUNITY PRINCIPLE:

The teacher candidate uses an understanding of individual and group motivation and behavior to create a learning environment that encourages positive social interaction, active engagement in learning, and self-motivation for all students.

Proficiency:	*n/o*	*1*	*2*	*3*	*4*
5.1. Candidates understand what may encourage or hinder student motivation and engagement in learning, based on an analysis of research and practice.					X
5.2. Candidates are able to construct comfortable and safe classroom environments for all students.					X
5.3. Candidates are able to construct a classroom environment that supports student motivation and learning and the creation of a "community of learners."					X

Additional comments: Students were often led in full classroom discussions w/ Molly. Molly successfully moderated classroom debates on evolution all while reaching ~~the~~her goal of having the students answer their essential question.

6. COMMUNICATION PRINCIPLE:

and my University Supervisor, Sue Wyand about the discussions (NSTA 5.f):

> "It appeared that the two of you had well choreographed your roles for the lesson. The agenda was on the board as well as the "Question Of The Day". You directed students to read the question and then watch the video clip that set the stage. The use of that clip engaged the students immediately and they were hooked. Their shared written responses indicated that the students were beginning to formulate opinions regarding ethical and moral ideas. When you asked them to share, they did so readily. You continue to honor all student's as learners as evidenced in their freedom to respond to your questions. Molly, you called on students who raised their hands and you looked for the reluctant student to engage in the conversation. Students were comfortable with making their responses and just as respectful of others adding their perspectives. This safe environment offers students the opportunity to share beliefs and provides them a place to put on the table differing ideas and perspectives without fear of ridicule or attack.
>
> The second question addressed the improvement of technology to the point of creating a "designer child". Students grappled with this and most students offered "no" as their responses, stating that people would lose their individuality, even after the second clip pointed to disabilities or diseases that could be eliminated. Student responses were more varied, and they listened to one another as they explained why made their decision. Most students responded and you again enlisted responses from students who didn't raise their hands. During this time, Molly, you asked an additional

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> question for consideration, "Would we lose our creativity if we eliminated all differences?" You also offered to the students to consider Bill Gates and performers as example of people who would never be. Additional recognizable examples are Tom Cruise, Whoopi Goldberg and Robin Williams, and at one time,most of the CEO"s of Fortune 500 companies."

In my four week placement at NorthWest College Prep I carried out many similar group activities and the students were used to working in teams several times a week. In addition, we invited the students to help us create informational classroom decor. I am most proud of the photosynthesis/respiration equation one in the picture below. The students cut out the pictures that were appropriate for each side of the equation, and drew the chloroplast and mitochondrion. They were also very pleased with the final result.

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When we were studying DNA, we built two different models - one as individuals and one in teams. The ones that they built as individuals still enabled a lot of group effort because some people were quicker to understand the three dimensionality of the design. The students

were very proud of their products, and we hung them around the classroom as decoration.

The first model introduced the double helix. The second model took it deeper with the individual molecules that make the nucleotides. In teams they constructed nucleotides, then strung them together. After completing a short section of DNA, they enacted replication by combining their nucleotides with the team next to them. After they had each completed two identical strands of DNA, through replication, (Please note that the linked lesson plan is for transcription, but that the lesson was roughly the same for replication.) Ms. Brown and I connected a portion of them together and hung it on the wall. Please see Sue Wyand's observation for an extensive description:

> "The cooperative nature of your lesson provided students with the opportunity to share what they know and understand with a peer. Starting with a duo and combining to form a group of four provided collaborative work time."

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More reviews of my ability to create a learning community are below:

Sue Wyand on acting out mitosis (previously discussed in Pedagogy and Equity):

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5. LEARNING COMMUNITY PRINCIPLE: *The teacher candidate uses an understanding of individual and group motivation and behavior to create a learning environment that encourages positive social interaction, active engagement in learning, and self-motivation for all students.*					
You have a clear understanding of the need to encourage all students to be an active participant in their learning. You took questions from many students and you called on students who were sitting back. Your acting out mitosis paired partners who likely may not interact with each other. The students were okay with this. Their behavior did not indicate any reluctance on their part. As a summary exercise the students were to give you 3 differences between mitosis and meiosis.					
Active participation of students was encouraged and valued.	NA	1	2	3	4
Students were encouraged to generate conjectures, alternative solution strategies, and ways of interpreting evidence.	NA	1	2	3	4
The teacher acted as a resource person, working to support and enhance student investigations.	NA	1	2	3	4
The metaphor "teacher as listener" was very characteristic of this classroom.	NA	1	2	3	4
Intellectual rigor, constructive criticism, and the challenging of ideas were valued.	NA	1	2	3	4

Sue Wyand on evolution stations (previously discussed in Content, Equity, and Pedagogy:

2. LEARNING PRINCIPLE *The teacher candidate understands how all children learn and develop, and can provide learning opportunities that support their intellectual, social and personal development. The teacher candidate understands that learning involves active engagement in culturally valued activities with knowledgeable others and the construction of new knowledge.*
Each of the four stations asked the students to obtain new information by different means. Students were able to consider similar pieces of evidence as Darwin did formulating his theory. Stations provided for individual and small group learning. The activities at the stations required that the students interacted with both information and each other to complete their work. It was apparent that the students enjoyed the conversations about the subject matter and, for the most part, liked helping their group members complete the assigned tasks

From JoAnn Morrealle on evolution stations:

5. LEARNING COMMUNITY PRINCIPLE: *The teacher candidate uses an understanding of individual and group motivation and behavior to create a learning environment that encourages positive social interaction, active engagement in learning, and self-motivation for all students.*

Having students work in small groups fosters co-operation and gives students the opportunity to share ideas in low-stakes settings. Molly is able to have many conversations with individuals to assess their understanding.

Active participation of students was encouraged and valued.
NA 1 2 3 4 ◉
Students were encouraged to generate conjectures, alternative solution strategies, and ways of interpreting evidence.
NA 1 2 3 ◉ 4
The teacher acted as a resource person, working to support and enhance student investigations.
NA 1 2 3 4 ◉
The metaphor "teacher as listener" was very characteristic of this classroom.
NA 1 2 3 4 ◉
Intellectual rigor, constructive criticism, and the challenging of ideas were valued.
NA 1 2 3 ◉ 4

As demonstrated above, I understand what may encourage or hinder student's motivation and engagement in learning, based on an analysis of research and practice. With this understanding, I am able to construct comfortable and safe classroom environment that supports student motivation and learning and the creation of a "community of learners."

6. Communication Principle

I received a score of 4 in all four of the standards for Communication on my final evaluation from Sue Wyand, Jo Ann Morrealle and Peter Kalenda.

6.1. Candidates understand the role of language in teaching and learning.

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In the words of Janks (2010), “language is fundamentally tied to questions of power.” The choice of words used in the classroom and accepted in writing are inextricably tied to equity issues. Language can empower students. Language can disempower students. Finding the words to do the latter is important. I have touched on this previously under equity. In my lessons, I strive to let the students use their own words while also giving them scientifically correct/academically appropriate language.

For example, in Advanced Placement Environmental Science, I assigned a reading from The New York Times Magazine that was a little above their usual reading level. Instead of letting them struggle through it, or give up, as they would likely have done, I made them a vocabulary list to accompany the article. On it, I included an admission that I did not know and could not find one of the definitions, which I later found and disseminated. That admission and subsequent definition demonstrates to the students that I am learning along with them, that I think that continuing to learn is valuable, and that there is no shame in admitting when one does not understand a word/concept. We followed up the reading with written questions as well as a discussion in which students were encouraged to speak in their natural voice.

I have considered how communication affects students by observing other teachers interact with their students. I completed a “dialogue investigation” on this issue for EDF 416S.

I have utilized concept maps (Novak 1991) to effectively organize my thoughts around lesson content and organization and intend to use them in my classroom in the future to frame the big picture of each unit, if not the entire year.

I am also very familiar with the use of models to convey information. In our beach investigation for EDU 487, we developed this visual model of the beach:

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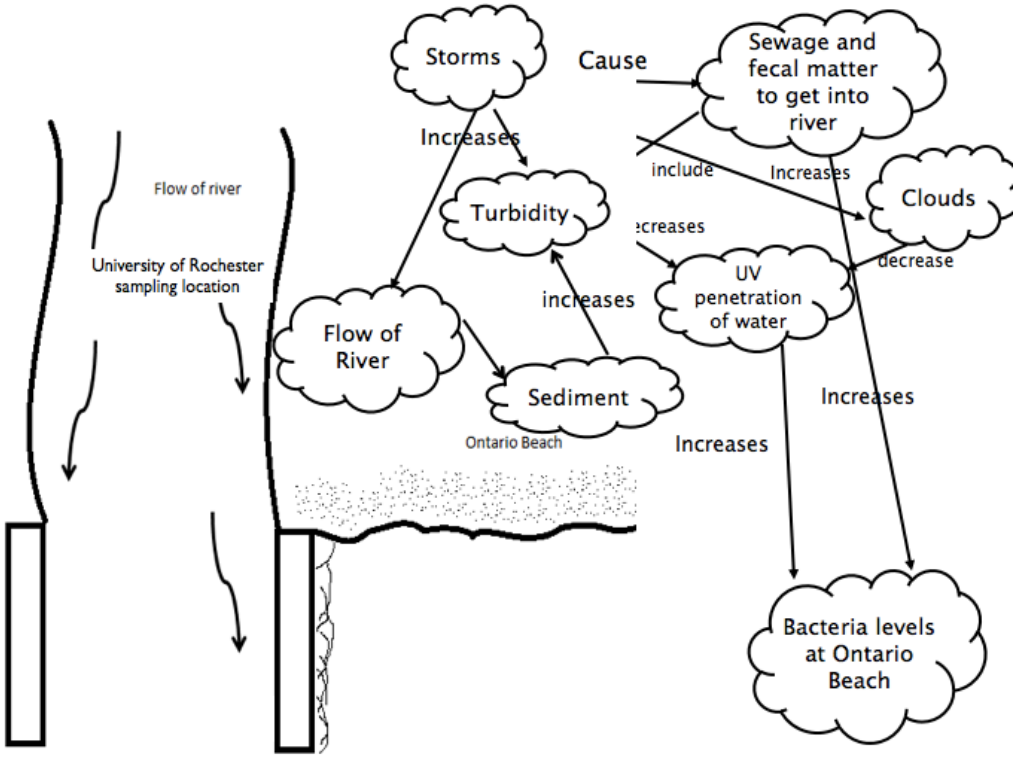

My students successfully made models at GRS Camp and in STARS. Understanding and producing models are an important part of inquiry, of higher level thinking and of life (Lehrer and Schauble, 2000). Therefore, my future students and I will produce models on a regular basis.

6.2. Candidates are familiar with and proficient in a wide variety of modes and vehicles for communication that can support learning and inquiry for all students.

Communication and "Literacy [have] always been dictated by the developments of technology: papyrus, parchment, quills, pencils, paper, pens, typewriters, computers" (Janks 2010). Computers have enabled many new forms of communication, several of which I have taken advantage of in the classroom. At NWCP, the students and I used a SmartBoard daily. I used it to show video clips, to play content rich games, to give instructions, as well as present

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Power Point™ lessons. At School of the Arts, we did not have a smart board, but we showed slides, movies and videos using a liquid crystal display (LCD) projector and screen.

At NWCP we introduced the students to Google Docs and to a classroom wiki that they used to complete assignments and have discussions. These online spaces ensured that every student contributed to the conversation, even those that usually choose to remain silent in class. In addition to using communication technologies during my student teaching (and STARS), I completed assignments utilizing Web 2.0 technologies for my EDU 498 class, Literacy Learning as Social Practice: YouTube, GeoCacheing, and RocWiki. Completing these assignments included not only learning how to use them, but also considering how they might be utilized in the classroom.

I used multimodal communication in every lesson. An agenda and essential question was posted on the board, as well as spoken at the beginning of each lesson. Students often began the lesson by journalling on topics that linked todays lesson to yesterdays or introduced a new topic. If the students were completing a task, the instructions were handed out to them on paper that they could hold and read, posted on the board, and spoken verbally as well as repeated by a student. Thus, they were exposed to information visually, auditorially, and kinesthetically (by writing).

In teaching students about DNA replication, I shared a YouTube video some (college) students had produced. This video included a very precise and accurate description of DNA replication using all the appropriate names for chemical compounds. This song was catchy and will help students remember some language that was new to them. It also was entertaining - they asked me to play it several times. JoAnn Morrealle observed this lesson and she wrote the following.

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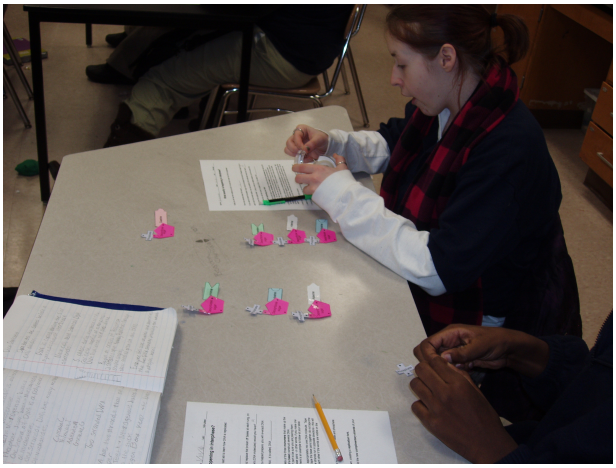
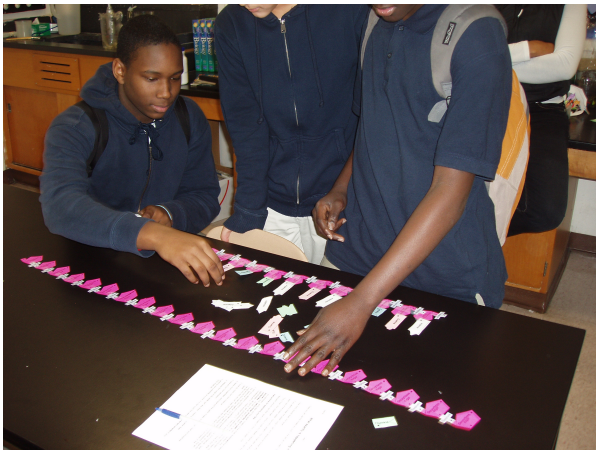
6. COMMUNICATION PRINCIPLE: *The teacher candidate understands the key role played by language in teaching and learning. The teacher candidate uses knowledge of effective verbal, non-verbal, and media communication techniques to foster active inquiry, collaboration, and supportive interaction in the classroom.*
There was good use of the Smart Board and online video resources to enhance the lesson.

After hearing/watching the song, hearing me explain the directions of the days task, reading the instructions together, students constructed DNA nucleotides individually, then strands in groups. Thus they were doing a hands on project while learning what molecules DNA is made of, how it fits together, and how it is replicated. The lesson required a good deal of communication between students and between groups. Students, read, spoke, heard, and built DNA.





At SOTA, Sue Wyand Observed the previously described lesson on Mitosis. The day before this lesson the students had drawn models of mitosis from slides. On the day of the observation, we engaged them with a journal question, then showed them a video model of mitosis, then asked them to act as chromosomes. During the acting it out portion of the lesson, we added visual cues after the first period we taught struggled. We said, verbally what phase we were in, as well as held up signs indicating both the name of the phase and a simple drawing of what was going on. At each side of the classroom we posted drawings of centrioles so the students knew where the poles of the cell were, and we put a line of tape down the

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center of the class to indicate the equator. Therefore, the students heard, watched, drew and acted out mitosis while receiving visual and auditory cues. Sue's review of my ability to communicate instructions during this lesson follows:

You continue to improve and perfect your teacher persona. You appeared very comfortable in front of the students whether interacting individually or whole group. Your directions were clear and students responded accordingly. When the noise level rose, you called the students back to appropriate class level noise. Your demeanor appears more confident as I see you lead a classroom. The students see you as a classroom leader. When you speak, they listen. You are also comfortable with students having appropriate class related conversations. Continue to develop different questioning techniques or use different questions (Why or How) to get students to think differently or further about a concept.

Students were involved in the communication of their ideas to others using a variety of means and media.	NA	1	2	3	4
The teacher's questions triggered divergent modes of thinking.	NA	1	2	3	4
There was a high proportions of student talk and a significant amount of it occurred between and among students.	NA	1	2	3	4
Student questions and comments often determined the focus and direction of classroom discourse.	NA	1	2	3	4
There was a climate of respect for what others had to say.	NA	1	2	3	4
In general, the teacher was patient with students.	NA	1	2	3	4

Our evolution unit also utilized a lot of multimodal presentation of information. JoAnn Morrealle observed the following:

Posted on the wall outside the classroom door, was the group assignments of the day. Students knew to look at their assignment and find their seat accordingly. On their way in, they helped themselves to the day's capture sheets. They were greeted by Ms. Gildea and her teaching partner, Ms. Milano. Students who needed help in finding their station were quickly directed to where they needed to go. The stations were clearly labelled and color coded. The There were 8 stations, two of each kind.

The lesson began with an explanation of the day's activity. "Imagine you are 22, you have completed college and are about to go on a voyage around the world. One of your stops will be the Galapagos Islands, where you will see what Darwin saw on his voyage. To help you imagine the environment at this stop, watch this video clip of the Galapagos Islands." The students watched a short video of the Galapagos Islands. "Today and tomorrow, you will be completing 4 investigations of evidence that will help you understand how Darwin was able to provide evidence for the Theory of Evolution." A brief description of the work done at each station was given. Instructions for rotating through the room were given. Students were asked if they were ready. When they said that they were ready, the "go" signal was given.

Students quickly began to work. They stayed on task completing the work at their first station. While they worked, Ms. Gildea circulated around the room. She checked in with each group, fielding questions and monitoring progress. A great deal of planning and preparation went into the station set-up. As a result, students had no trouble following instructions and completing the station task. When given the signal to move to the second station, students knew where to move and quickly did so. A few students said that they needed a bit more time at a station. They were told that time was built in to the second day for returning to a station that had not been finished.

Practices to continue: Creation of lessons that allow students to explore and to process information on their own; extensive planning and preparation making the lesson go smoothly, use of a variety of medium to convey the message.

6.3. Candidates are able to use effectively a variety of modes of communication to make ideas accessible to all students and foster inquiry.

I have given a few examples of this above in my Mitosis and DNA replication lessons I used spoken word, videos, songs, students writing and images to convey information.

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In our evolution unit at SOTA, and in all labs, we used colors and numbers posted on the door to identify groups and their locations. These corresponded to colors and numbers on tables in the classroom that showed the students where to sit with their assigned group. This made classroom entry efficient and we could start the hands on, inquiry lessons without delay. Instructions were taped to the table at each station, including how to manage the materials that were present at each station. Classroom and materials management are important parts of running effective inquiry lessons. Logistics of such lessons often intimidate teachers; we have overcome that with effective communication.

In addition to effectively communicating instructions, we created a space in which the students could communicate with each other. Sue Wyand observed:

The type of work at the stations encouraged the groups to talk among themselves as they each viewed what they learned through their own personal lens. The ability to share what they got from each part had the potential to enrich the learning of the group as a whole. Some students were more serious about their work. Some students enjoyed the social aspect of the work, not always concentrating on the quality of their responses. You encouraged some students to share what they interpreted with their group. This allowed different types of thinkers to put their spin on what they had just completed.					
Students were involved in the communication of their ideas to others using a variety of means and media.	NA	1	2	3	4
The teacher's questions triggered divergent modes of thinking.	NA	1	2	3	4
There was a high proportions of student talk and a significant amount of it occurred between and among students.	NA	1	2	3	4
Student questions and comments often determined the focus and direction of classroom discourse.	NA	1	2	3	4
There was a climate of respect for what others had to say.	NA	1	2	3	4
In general, the teacher was patient with students.	NA	1	2	3	4

JoAnn Morrealle took photographs of our evolution stations that demonstrate some multi-modal practices. In addition to hands on activities, we also included a video and text about Darwin's struggles with introducing his theory to society. Then we asked the students to discuss questions about what they had seen/heard and read. For all videos possible, we included captions. Because we had a deaf student in our class, we had a transcript produced for her of the one movie we could not get captions for. Here is a picture of students at the

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Darwin station. The deaf student is facing the computer screen so she can read the captions more clearly.

Whenever we presented information in a transmission style, we gave the students notes sheets to help keep them focussed, and help them learn how to take notes. These notes sheets did not exactly follow the text of the slides, but they covered the same information. We did this purposefully to encourage the students to process the information before the wrote it down. We included images for concepts that seemed better described by visual models than words. The following image is of a formative assessment after a presentation on natural selection. The image is included as a visual cue:

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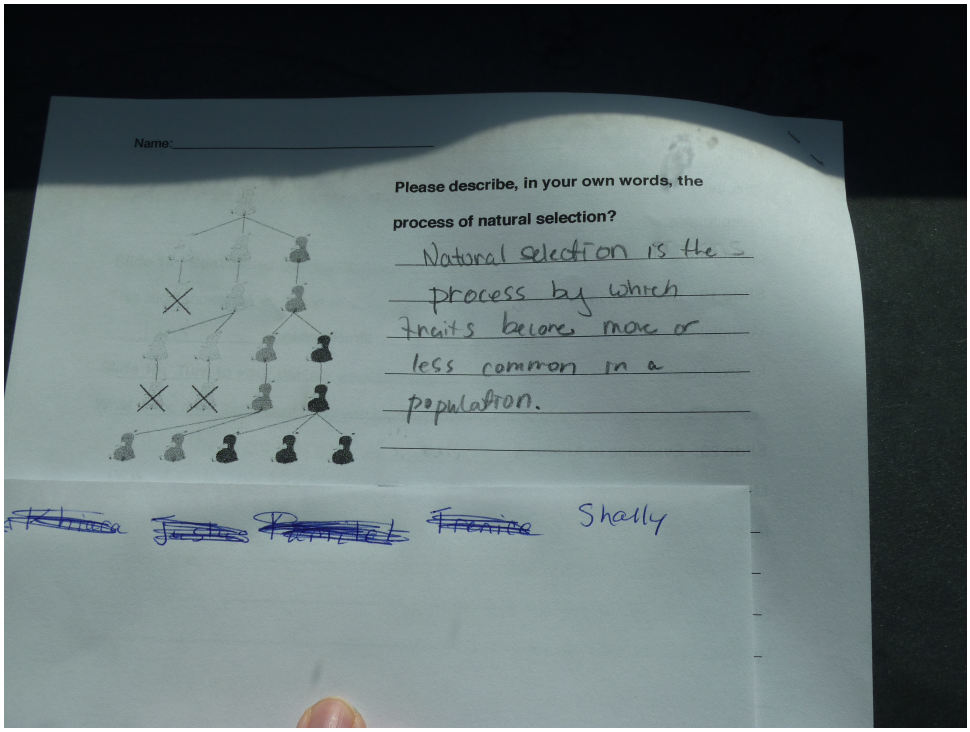

These are other notes from the same presentation:

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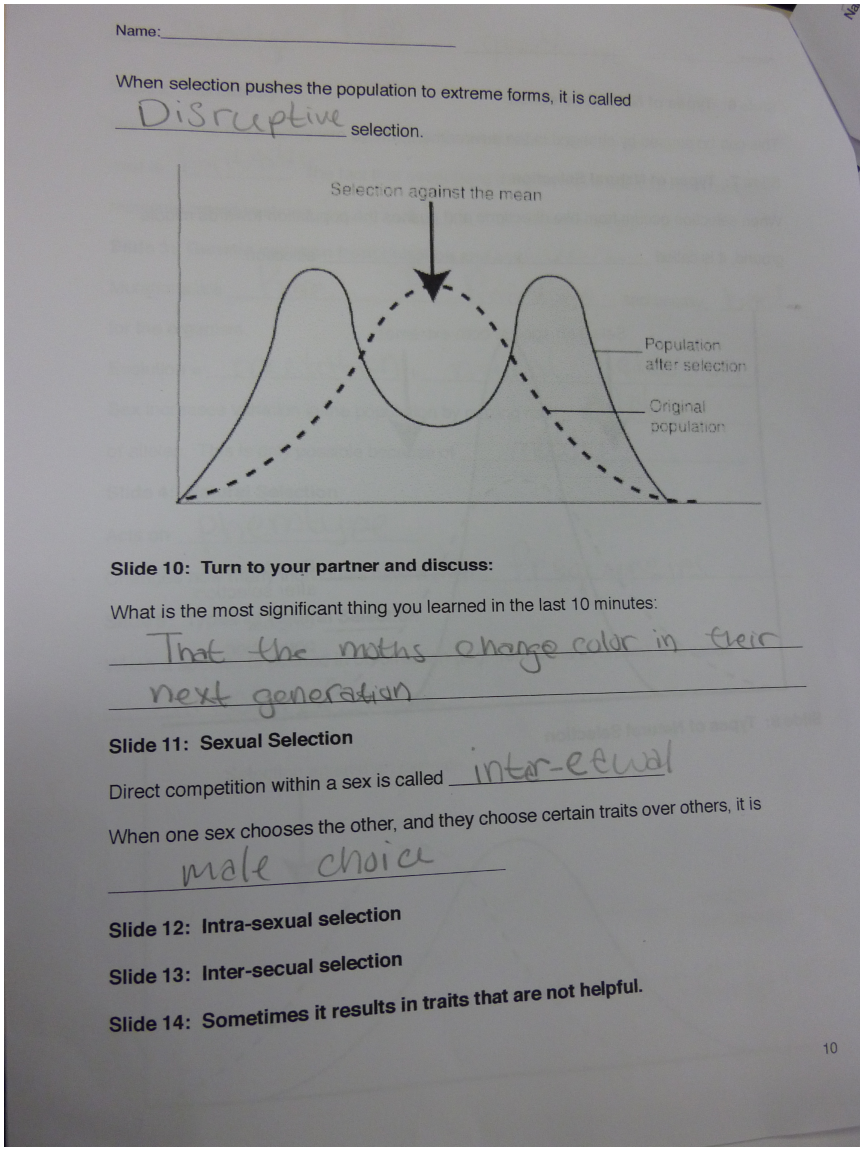

Name:_____

When selection pushes the population to extreme forms, it is called Disruptive selection.

Slide 10: Turn to your partner and discuss:

What is the most significant thing you learned in the last 10 minutes:

That the moths change color in their next generation

Slide 11: Sexual Selection

Direct competition within a sex is called inter-sexual

When one sex chooses the other, and they choose certain traits over others, it is male choice

Slide 12: Intra-sexual selection

Slide 13: Inter-secual selection

Slide 14: Sometimes it results in traits that are not helpful.

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On “Slide 10” you will notice that we include a brief “think.pair.share.” We did this every 10 slides to encourage group discussion of the information. It allowed for discussion in pairs as well as whole class discussions that enabled me to gauge the classes understanding of the material.

In the last two sections, I have provided examples of using multiple modes of communication to present information to students and encourage their discussions and inquiry into given topics.

6.4. Candidates construct curriculum activities that incorporate oral, written, visual, and electronic texts as tools for interaction and communication across multiple contexts, and that facilitate all students’ critical analysis of such texts.

We continued communicating instructions in multiple forms during the media project section of our evolution unit. Students worked in pairs to research a specific topic in evolution and create a media presentation. Most of their research was on the internet and their presentations ranged from a short story to a rap to Power Point™. Before sending them off

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into wilds of the internet, we asked the librarian to speak to them about how to find reliable information on the internet. We also pointed them to a website that I made to give them some background information and instructions. We told them out loud what we expected their final projects to include, we posted those guidelines on paper on the wall, we gave them "tickets out the door" that ensured that they had read the entire website before they began researching in earnest. We were also present and available for the whole time that they did their research (5 days). Here are pictures of them working on the computers:

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You can see signs posted around the room with instructions and recommended websites from which to gather information. This research and presentation required that they work as a team, and consult with us to decide which information was accurate and which was worth sharing with their classmates.

In addition to communicating instructions and expectations effectively, we did our best to communicate content information in multiple forms. This often included videos from popular culture. In a lesson on punnet squares and genetics, we showed clips from the movie "Gattica" asked them to write about it, then discussed the implications of the clips. Sue Wyand observed:

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Our plan was to have me stay for back to back classes to see the diversity of students in your classes. You planned to use the same lesson with both classes. Again your tasks were shared and your directions were the same to the next group. This group of students needed more prompts to get to the question of the day and the agenda. Molly, you offered more transitional cues, "Should be no talking', "One more minute" to keep the students focused. They responsed positively to these gentle nudges. You also set the ground rules for discussion and responding to peers answers. The students had great comments about leaving individuality to chance, "It makes us who we are", "people should be appreciated for who they are". As you moved to the second clip, the students were engaged from the beginning, begging to see the whole movie. You offered them a different lens to examine something emerging in science. You asked for volunteers and studenrts obliged. In addressing the issues the second clip presented, the best reponse from one student was " A child doesn't have to be perfect". The kids were able to look

2

beyond the offered perfection to the qualities that make us human.

This activity, in particular, emphasized critical analysis of the film and of our society, and what the students think is important, what makes us human.

In general, I think that communication is one of the most important skills that students can learn. Although it is a key part of the nature of science, it is often overlooked in science classrooms. In my classes I did/will do my best to make it part of every day activities. This includs journalling, reading scientific papers, reading science news and opinion articles (e.g.

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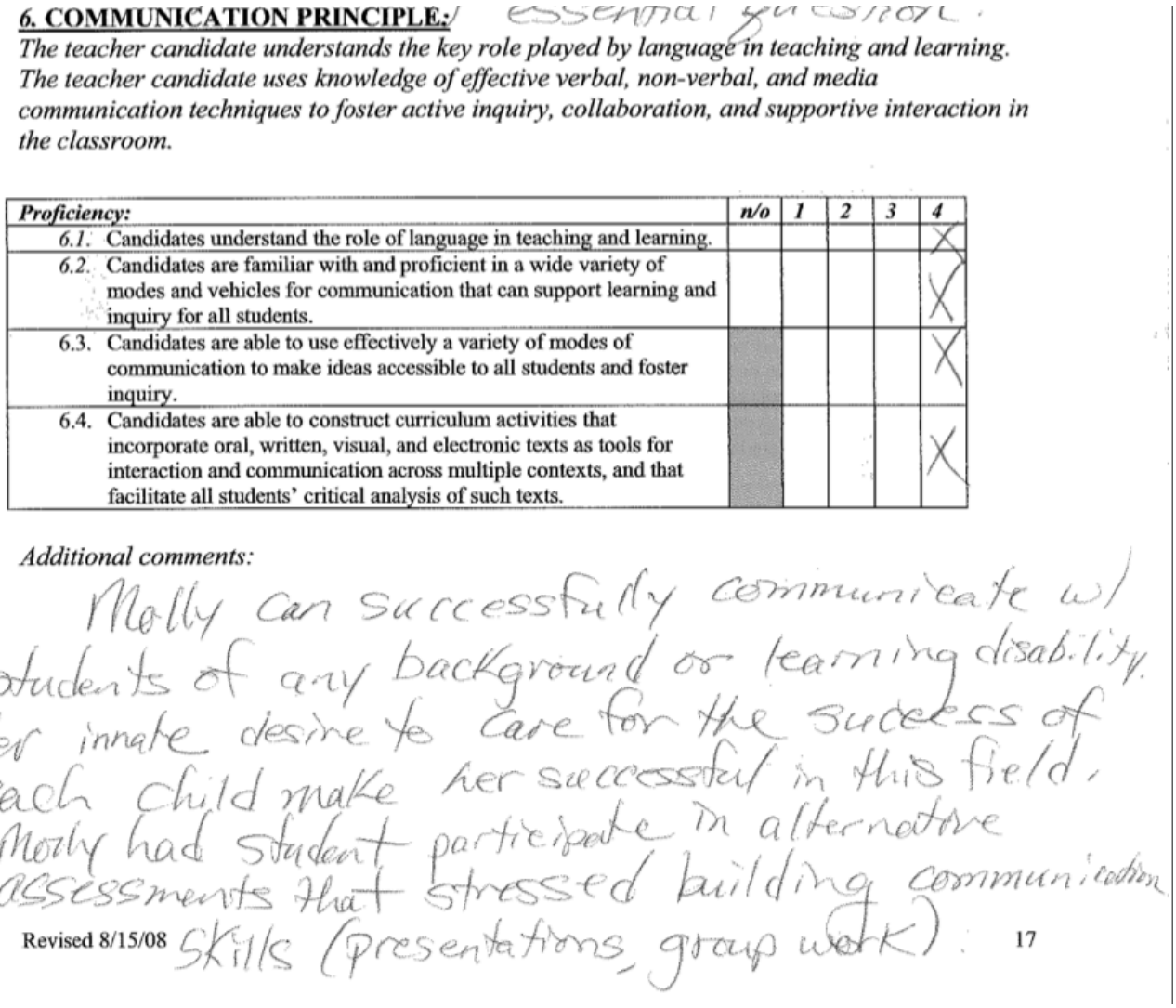
Power Steer mentioned earlier), writing, and lots of discussions in small and large groups. On my final evaluation, Peter Kalenda wrote the following:



6. COMMUNICATION PRINCIPLE: essential question:

The teacher candidate understands the key role played by language in teaching and learning. The teacher candidate uses knowledge of effective verbal, non-verbal, and media communication techniques to foster active inquiry, collaboration, and supportive interaction in the classroom.

Proficiency:	*n/o*	*1*	*2*	*3*	*4*
6.1. Candidates understand the role of language in teaching and learning.					X
6.2. Candidates are familiar with and proficient in a wide variety of modes and vehicles for communication that can support learning and inquiry for all students.					X
6.3. Candidates are able to use effectively a variety of modes of communication to make ideas accessible to all students and foster inquiry.					X
6.4. Candidates are able to construct curriculum activities that incorporate oral, written, visual, and electronic texts as tools for interaction and communication across multiple contexts, and that facilitate all students' critical analysis of such texts.					X

Additional comments:

Molly can successfully communicate w/ students of any background or learning disability. Her innate desire to care for the success of each child make her successful in this field. Molly had student participate in alternative assessments that stressed building communication skills (presentations, group work)

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I also used movies and multiple forms of communication in my DNA replication lesson mentioned above. Sue Wyand observed and offered the following suggestions, which I will

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take into account when planning in the future.

2010-2011 Get Real Science Classroom Observation Form

Student Teacher Name Molly Gildea **Observer Name** Sue Wyand **Date** 01/14/2011

Location Northwest College Prep **Lesson Plan Title** DNA Replication

Narrative: In the space below, give a brief description of the lesson observed, the classroom setting in which the lesson took place (space, seating arrangements, etc) and any relevant details about the students (number, gender, ethnicity) and teacher that you think are important. Use diagrams if they seem appropriate. Use additional pages as necessary.

As you began this class, students continued to talk. I liked how you spoke louder and told them you would wait. They quieted down and focused on you as you began the class. Your opening questions required students to recall prior knowledge on DNA structure and function. The highlight was the video on DNA Replication. Key vocabulary was part of the song. I would have the lyrics available for the students to follow along. To get them to focus on the process of replication, ask students to highlight those key pieces and vocabulary needed to complete the new DNA strand. The tune will remain with the students and in the future as students review the key concepts , you can refer to the video. The students really liked seeing how students in the video explained the replication process, asking to see it a second time. You might consider asking your students if they would like to do something similar in the future for an upcoming topic. Your lesson provided different modalities for the students to experience learning about a key genetic process. Video with music, power point and manipulatives allowed your students to experience learning through multiple pathways.

I demonstrated above that I understand the need for and can use multiple forms of communication to encourage inquiry and critical analysis of “texts.”

7. Planning Principle

NSTA standards:	*1*	*3*	*4*
6.a Candidates understand the curricular recommendations of the National Science Education Standards, and can identify, access, and/or create resources and activities for science education that are consistent with the standards.			
7.a Candidates identify ways to relate science to the community, involve stakeholders, and use community resource to promote the learning of science.			
7.b Candidates involve students successfully in activities that relate science to resources and stakeholders in the community or to the resolution of issues important to the community.			

7.1. Candidates are able to align instruction with learning goals consistent with professional and New York State standards.

I follow Wiggins and McTighe’s (2005) method of planning backwards. I first look at the New York State and National Science Education Standards (NSES), frame the big picture and essential question of the unit, articulate my goals, then objectives. Simultaneous to clarifying my goals, I design the assessments that will determine whether the students and I are achieving those goals. From there I move on to design activities that will enable us to achieve our goals.

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This began with camp, for which we articulated our goals (NSTA 7.a) first as a team and then designed our lessons around them. I wrote the lesson plans for data collection and presentation design. Camp successfully related science to resources (the beach) and to stakeholders (the students and their families) in the community and addressed ways to solve the problem of frequent closures (NSTA 7.b). These goals, and the STARS goals (NSTA 7.a) were mostly nature of science oriented - and geared at making students identify as scientists. We planned these based on the following standards (NSTA 6.a). We based our objectives on the goals and standards. We designed our assessment to analyze whether we were achieving those goals and objectives. The STARS project successfully related science to the students because they all drink or know people who drink energy drinks (NSTA 7.b).

I continued the practice through my four week placement. In addition to writing lesson plans for my series of three innovative lessons (1, 2, 3), I wrote a unit plan for genetics using the school's Atlas Rubicon curriculum mapping system (that I can no longer access, but here is a rough draft of it). During these lessons, I sought to create a common experience from which to launch a lesson/discussion about stress responses and the endocrine system (NSTA 7.a). In addition, when we moved on to body systems we related it to their lives - most commonly we discussed diabetes and how the body systems are involved. This issue touched them because almost every student in the class had (and I have) a relative with diabetes (NSTA 7.a).

During my eight week placement at SOTA, with Theresa Milano, we continued this practice throughout the placement. However, it is most evident during our evolution unit. We wrote this unit plan over many weeks beginning with identifying standards (NSTA 6.a), articulating goals and objectives and designing assessments. We then wrote lesson plans for

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each day. The lesson plans that I wrote included: Stations, What did Darwin think the evidence suggested?, and More current evidence supporting Darwin. Peter Kalenda, my co-operating teacher states:

7. PLANNING PRINCIPLE:
The teacher candidate plans instruction based upon knowledge of subject matter, students, the community, and curriculum goals.

Proficiency:	*n/o*	*1*	*2*	*3*	*4*
7.1. Candidates are able to align instruction with learning goals consistent with professional and New York State standards.					X
7.2. Candidates are able to implement lessons according to a well-defined and high quality plan.					X

Additional comments:
Molly built all of her lesson plans w/ the framework of NYS standards. If of her lessons listed w/ standards/principles were addressed

Lawanda Brown writes:

7. PLANNING PRINCIPLE:
The teacher candidate plans instruction based upon knowledge of subject matter, students, the community, and curriculum goals.

Proficiency:	*n/o*	*1*	*2*	*3*	*4*
7.1. Candidates are able to align instruction with learning goals consistent with professional and New York State standards.					x
7.2. Candidates are able to implement lessons according to a well-defined and high quality plan.					x

Additional comments:
Molly spent countless hours planning each of her lesson and asking for feedback through the process. I would often critic the lesson after the first demonstration. She was open to constructive criticism and adjusted the lessons accordingly.

In our unit analysis we expand on how the NSTA standards aligned with our lessons.

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7.2. Candidates are able to implement lessons according to a well-defined and high quality plan.

I am able to implement my lesson plans as written, but am also willing and able to modify them as necessary.

This is evident in my observations from my four week placement. The following are comments made about my series of three:

Sue Wyand:

Additional Comments: The lesson was a creative way to get students thinking about stressors on the fish and cause stressors in the students, thus creating a first hand experience of their endocrine systems. Students will remember this as they move through studying the rest of the body systems. The student connections to the lesson went so far as to giving the students opportunity to own their "subjects".

JoAnn Morrealle:

Notes from Informal observation on 11/15: Students entered a well-ordered classroom and were quietly greeted by Ms. Gildea. The agenda was posted on the board, all of the materials needed for the days activity were prepped and in easy to access location in the back of the room. The day's lesson was on homeostasis. The students would be modeling two types of homeostasis: external produced and automatically produced. The challenge was to maintain a water temperature that would allow a goldfish to remain alive as hot and cold water were added in varying amounts. Students were also asked to monitor their own reaction to the stress of the challenge. Ms. Gildea started the class with a brief introduction of the observers. She then began a group talk session on the meaning of homeostasis. She briefly explained the challenge and then gave the "go ahead" signal. Students quickly organized themselves into

groups; got their materials and waited for the tone to sound that would indicate the trial had begun. They were to quickly dump a beaker of hot water into the fish environment, and work as fast as possible to bring the temperature back to a temperature which would allow their fish to live.

The students took their task seriously. They measured and recorded the changes in the temperature; they encouraged each team member to do their part; they were concerned for the well being of their fish. While they were externally regulating

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I was organized and prepared and the lessons were successful. I continued this through my eight week placement.

Sue Wyand's write up of her observation of our lesson the ethics of gene determination stated, "You brought your lesson plan to life during the class time and the students were engaged with your hook to get them thinking a bit more critically about a topic they may face in their future." It also included the following comment about how Theresa and I worked together:

> It appeared that the two of you had well choreographed your roles for the lesson. The agenda was on the board as well as the "Question Of The Day". You directed students to read the question and then watch the video clip that set the stage. The use of that clip engaged the

This comment is significant because working with a co-teacher re-enforced the need for planning. We each needed to know our role in the lesson and make smooth transitions between us. We also took turns writing lessons, so we needed to plan ahead to know that our lessons were connected and what we would be doing each day. We did this with great success.

Sue's evaluation of the evolution stations included:

Students were involved in the communication of their ideas to others using a variety of means and media.	NA	1	2	3	4
The teacher's questions triggered divergent modes of thinking.	NA	1	2	3	4
There was a high proportions of student talk and a significant amount of it occurred between and among students.	NA	1	2	3	4
Student questions and comments often determined the focus and direction of classroom discourse.	NA	1	2	3	4
There was a climate of respect for what others had to say.	NA	1	2	3	4
In general, the teacher was patient with students.	NA	1	2	3	4
7. PLANNING PRINCIPLE: *The teacher candidate plans instruction based upon knowledge of subject matter, students, the community, and curriculum goals.*					
Your plan was clearly articulated as to the process students would experience at each station. The handouts acted as the guide so students were more independent and responsible for this initial exposure to evolution. If possible, you may want to add color to your hand outs. Graphics on the page to cue the students; different color sheets for different stations or pictures with colors to highlight key concepts or points.					

While I was always prepared and successfully implemented my lessons, I was also willing and happy to adjust them to the students as the day went on, I will discuss that further in professional practice.

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8. Assessment Principle

NSTA standards:	*1*	*3*	*4*
8.a Candidates use multiple assessment tools and strategies to achieve important goals for instruction that are aligned with methods of instruction and the needs of students.			
8.b Candidates use the results of multiple assessments to guide and modify instruction, the classroom environment, or the assessment process.			
8.c Candidates use the results of assessment as vehicles for students to analyze their own learning, engaging students in reflective self-analysis of their own work.			

8.1. Candidates understand the multiple purposes of assessment and are familiar with a variety of assessment and evaluation strategies, their purposes and potential uses.

I have thought about assessment from the beginning of this program. We performed an assessment investigation in seminar. In my theoretical framework, I write:

> I always design the assessment of student learning first, and work backwards from there so that I have a clear vision of what knowledge I want the students to gain from any given unit. Assessments vary in approach from tests, through journals, writing assignments, lab investigation write ups, oral discussions to video documentaries. Assessments occur for both the group and for individuals. Multimodal assessment offers varied learners different opportunities to express what they have learned. Hopefully, the assessments are integrated with learning enough that they are not the focus of student work. Mastery of the subject is the goal of student work.
>
> By proposing problems that affect students' lives and scaffolding investigations appropriately depending on age/ability, I will hopefully find their intrinsic motivation for mastery. Like critical science education theorists (Fusco and Barton, 2001), I believe that scientific literacy is empowering and should be available to all people.

My goal is that students understand the material and are able to transfer it to new contexts. Assessments should therefore allow all students to show their knowledge by using it in new contexts. "We want students to transfer knowledge - to use what they know in a new situation. Teachers should set up realistic, authentic contexts for assessment that enable

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students to apply their learning thoughtfully and flexibly, thereby demonstrating their understanding of the content standards" (McTighe and O'Conner, 2006, p 14).

Most importantly, assessment is for helping ensure that students are learning and that teachers are designing appropriate lessons. "Assessment must recapture essential educational aims: to help the student learn, and help the teacher instruct. All other needs, such as accountability testing and program evaluation, come second" (Wiggins, 1997, p 24). Assessments are to judge student learning and to allow teachers modify their lessons to in response to student learning. Therefore, they need to occur during the learning process, not just at the end. "Waiting until the end of a teaching period to find out hew well students have learned is simply too late" (McTighe and O'Conner, 2006, p 13).

Students thrive at different things. Providing one standard format for assessment is not fair because it will always favor some students over others. Concept maps are an excellent option to offer students (Novak, 1991). Essay tests are another good option because they force students to form arguments and support them with evidence. "If science courses are to produce scientifically literate students who will be able to vote intelligently on science/ technology/society issues, the courses must provide the opportunity for students to formulate and defend their own opinions" (Lawrenz, p 66). I have always believed in multiple forms of assessments, but my imagined assessments were fairly traditional and have been broadened by Warner classwork. In my student teaching, I have tried using multiple forms of assessment, including letting the students make comic strips and write songs with some success. I would like to continue this method of open ended instructions - telling them what they need to present, but not how to present it. I am very intrigued by the whole class inquiry assessment described by Gallagher-Bolos and Smithenry (2008) and intend to use that in my teaching.

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In our efforts to create life long learners, we need to also teach students to reflect on their own methods of learning, motivations and interests. “Teachers can encourage students to meta-cognitively reflect using one of many strategies, such as writing prompts, journal entries, minute papers, or open class discussions (Oakes and Lipton, 2007, p 37).

Assessments are pointless if students do not receive feedback on their work. Precise, prompt and personalized responses to homework improve student understanding and achievement as well as teacher satisfaction (Berliner & Casanova, McTighe and O’Conner, 2006).

McTighe and O’Conner (2006) suggest many other methods to improve learning, including pre-testing. “Diagnostic assessment is as important to teaching as a physical exam is to prescribing an appropriate medical regimen” (McTighe and O’Conner, 2006, p 16) Students arrive with misconceptions. Teachers need to know what they are in order to address and correct them.

Students should be given rubrics and exemplars so that they know what is expected of them and can learn to match their work with those expectations. Wiggins and McTighe believe in self assessment and find the students’ assessments of themselves gradually align with the teachers. Lastly, they suggest that teachers should assess if, not when students learn something, so re-grades should not be averaged with old grades. The new grade should replace the old one. I believe all of this.

I think it is important to allow students the opportunity to share their knowledge in a variety of forms. However, to succeed in today’s, post No Child Left Behind, educational environment it is important that they learn to take multiple choice tests. Therefore, in addition

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to multimodal assessments, each unit should include some multiple choice question form of assessment.

8.2. Candidates are able to use a variety of assessment and evaluation strategies, including some that are embedded in authentic learning activities and have real audiences and purposes, to monitor, assess and provide guidance to student learning over time. (and NSTA 8.a)

I am able to use a variety of assessment and evaluation strategies, including some that are embedded in authentic learning activities and have real audiences and purposes. GRSC and STARS are both excellent examples of this. In both of these programs, the campers/ students produced a presentation for an audience of peers, parents, and community stakeholders. In GRSC, as described in previous sections, the campers worked as a team to investigate an authentic and relevant question to them: "Why is Ontario Beach closed so often?" I wrote the lesson plan for the design of their station at the presentation. Our students wrote and filmed skits to present at the symposium for their school. They created a station at which to teach the younger students at the Freedom School about their work. Here are some

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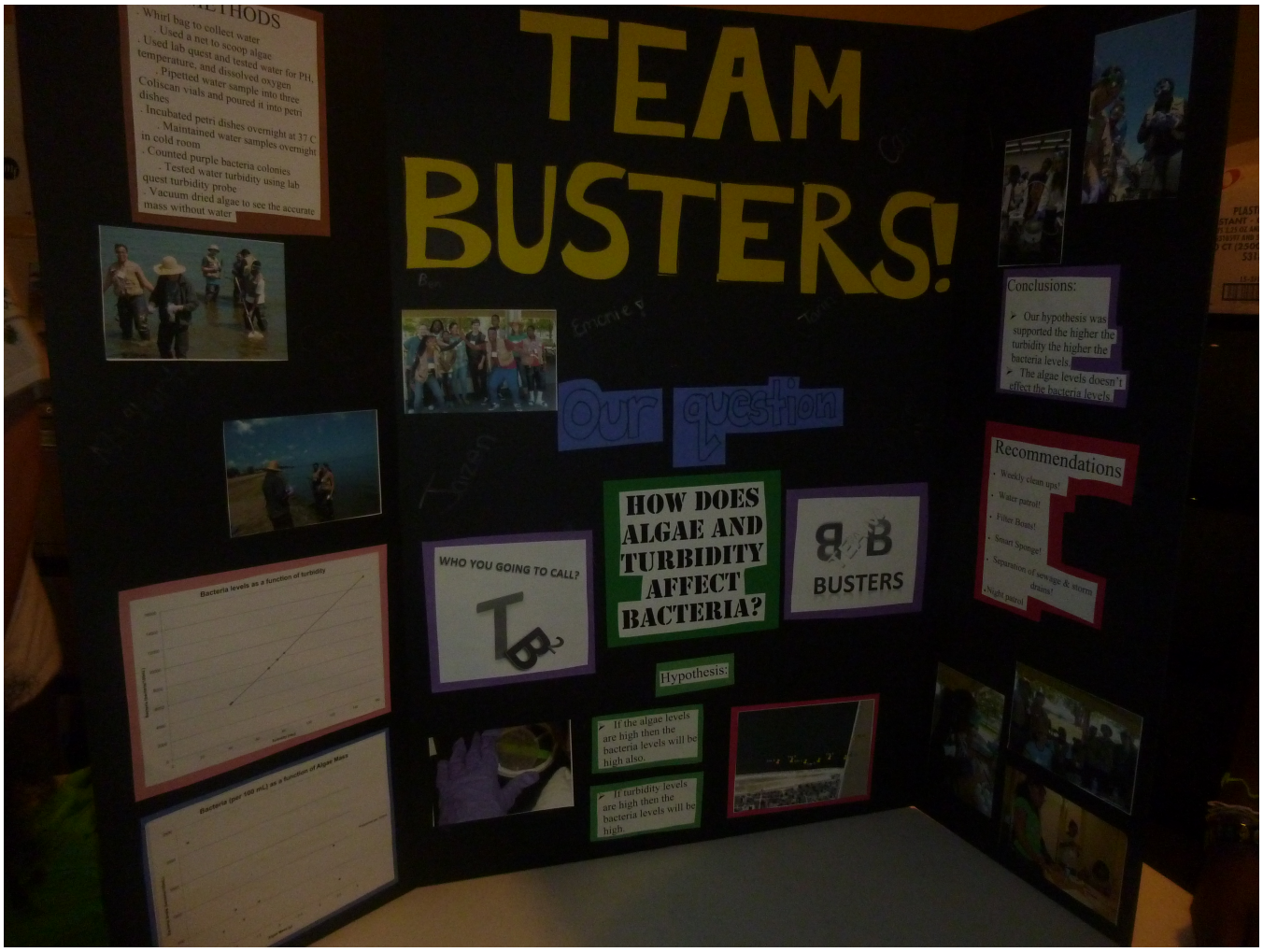
pictures of their poster and our campers manning their station:



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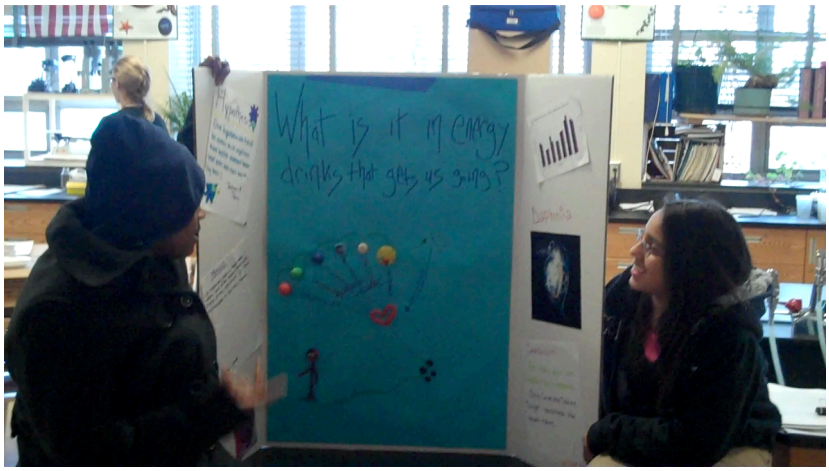
This photo is of Tyler Lucero showing the video that we made to some younger students:

In STARS, the girls also produced a poster and manned a table after a brief video presentation we (Harvey Williams and I) produced using filmed interviews of them. Here they are practicing talking about their poster (double click to play):



I also asked the students to make presentations in my student teaching, although the audience in those cases was generally just their class. At NWCP students worked in teams to produce a presentation about a body system. Most of the groups chose to make a poster and talk about it, but one wrote and performed a rap, and one made the poster a comic strip. The

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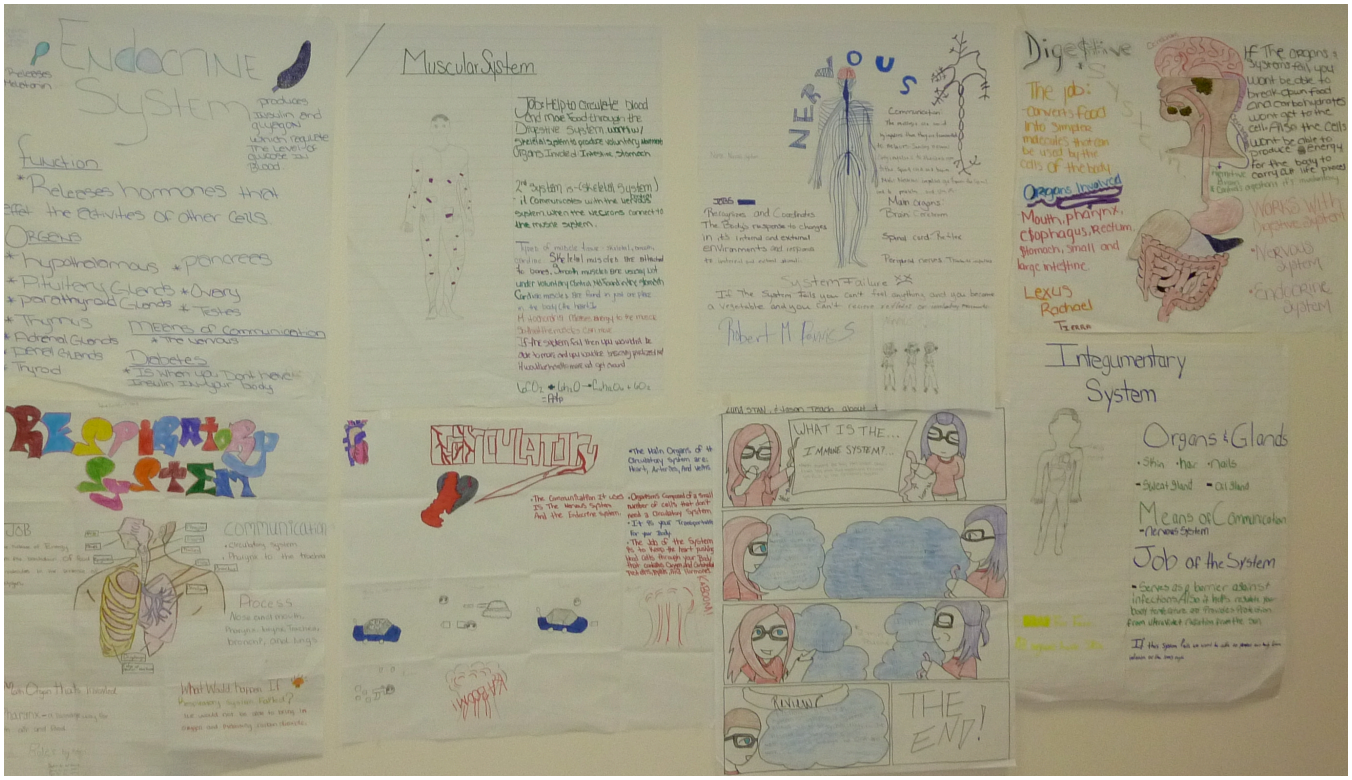
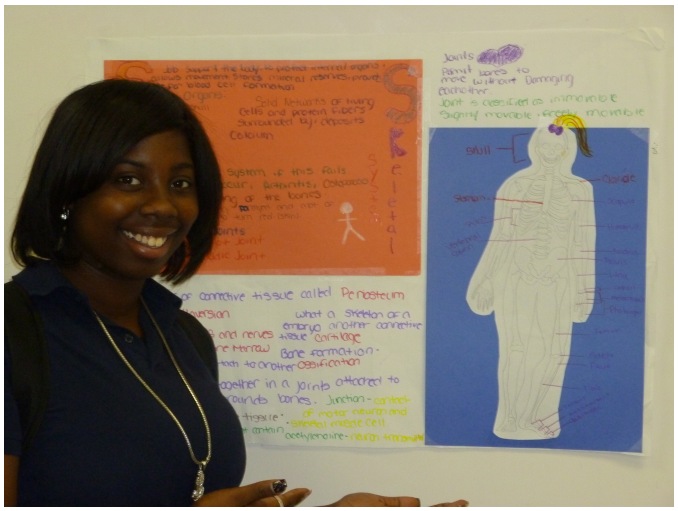
students were graded on the content of their presentations, not their artistic abilities. However, the students that were most engaged in making a creative presentation seemed to include the most information. Here are all the posters:



Some of the students were particularly proud of theirs:



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I continued this practice of giving the student a list of expectations and telling them they could present it in any form they chose at SOTA. This time the students were presenting on a choice from a list of evolution topics. Again, this produced many topics in the same format (Power Point™) but a few more creative offerings. Again, the more creative presentations seemed to come from the more invested students (in that project).

In addition to presentations, I conducted daily formative assessments. These varied from bellwork and tickets out the door, classwork, and homework to journalling, and discussions. These assessments allowed me to gauge each student's understanding and misconceptions of topics and decide whether to move on or re-enforce the material with a clarification or an extra lesson. The variety of assessments we used in our evolution unit are described in detail in our unit plan.

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Peter Kalenda's final evaluation reflects this use of multiple forms of assessment:

Proficiency:	*n/o*	*1*	*2*	*3*	*4*
8.1. Candidates understand the multiple purposes of assessment and are familiar with a variety of assessment and evaluation strategies, their purposes and potential uses.					X
8.2. Candidates are able to use a variety of assessment and evaluation strategies, including some that are embedded in authentic learning activities and have real audiences and purposes, to monitor, assess and provide guidance to student learning.					X
8.3. Candidates are able to use assessment to inform instruction by making links between their teaching and student performance and by adjusting their practice as a result of analysis of and reflection on student assessment data.					X
8.4. Candidates are able to have a positive effect on their students' learning.					X

Additional comments:

Morly utilized multiple forms of assessment during her placement, and altered assessment to better fit the learning needs of her students.

Before beginning units, it is important to gauge what students already know and what misconceptions they have. Therefore, when possible I performed assessments of prior knowledge. Two example of this are from GRSC and our evolution unit. In the evolution unit, we gave the students the same survey at the beginning and the end of it to judge their growth.

As demonstrated above, I am able to use a variety of assessment and evaluation strategies, including some that are embedded in authentic learning activities and have real audiences and purposes, to monitor, assess and provide guidance to student learning over time.

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8.3. Candidates are able to use assessment to inform instruction by making links between their teaching and student performance and by adjusting their practice as a result of analysis of and reflection on student assessment data.

I used the knowledge that I gained from the GRSC assessments (everyone in the cohort assessed a different subject and we pooled our knowledge) of prior knowledge to plan my lessons for camp. Knowing what the campers already knew about the beach prevented me from insulting them or boring them with information they already knew.

Similarly, the assessment of prior knowledge that Theresa and I used in our evolution unit allowed us to identify areas where the most students had misconceptions, or concepts that they might struggle with and focus on those when designing our lessons, most specifically it affected the slide presentations that I gave. In addition, reading their write ups from the stations, and listening to their discussion enlightened us about continuing mis-conceptions that we addressed in the following lessons.

I always grade bellwork and tickets out the door promptly so that I can adjust the next days lesson to account for any mis-understandings that the students hold. During group work, I circulate the room, asking the students questions and listening to their conversations. In small groups I work with them to correct misunderstandings. When I discover a common misconception, I bring the class's attention back to the front of the class and address the issue. During my DNA replication lesson (described previously) I found that the students had a hard time doing the replication, so I stopped the lesson and re-described the task while drawing a picture on the board to illustrate it. Sue Wyand observed the following:

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The cooperative nature of your lesson provided students with the opportunity to share what they know and understand with a peer. Starting with a duo and combining to form a group of four provided collaborative work time. With a group this large you may need to read the instructions with the whole group. You could then ask a student to explain in their own words what they are suppose to do. You could also put a teacher sign off at different points so you can check their progress in the correct completion of the task. This may prevent confusion. You recognized that your students were struggling with the group of four task. Stopping all work and asking the students to focus on you and the drawing on the board was a good way to set everyone back on track. It also allowed students to ask any questions to clear up any misunderstandings.

We also used formative assessments to modify our instruction as necessary when teaching mitosis and meiosis. Sue Wyand observed the following:

8. ASSESSMENT PRINCIPLE: *The teacher candidate understands and uses formal and informal assessment strategies to evaluate and ensure the continual intellectual, social and physical development of all learners and to inform instruction. Assessment is embedded in authentic learning activities that are for real audiences and real purposes.*
You planned for multiple point of formative assessments to gauge the students level of understanding. The acting out gave a visual representation, the journaling provided written evidence of learning or misconceptions on the students part. You use these samples to plan what your next steps are to solidify student learning.

I used daily, almost continuous formative assessments of student understanding to monitor student understanding and progress and modify my lessons as necessary.

8.4. Candidates are able to have a positive effect on their students' learning.

My ability to have a positive effect on student learning is demonstrated in my unit plans for STARS and our Evolution unit. Both of these show growth in students confidence and understanding in biology.

In addition, Sue Wyand observed the following during the lesson, "ethics of gene determination lesson":

You both moved from student to student, checking on their progress and asking how they arrived at the results they deteermined You asked the students about which traits were homozygous or heterozygous and why. Most students answered your questions correctly. You asked the students who didn't understand to walk you through the process they used to determine dominant and recessive traits and the statistics related to outcome.

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The evidence cited above, throughout section 8, shows that I understand the multiple forms of assessment and am able to use them successfully to have a positive impact on student learning.

9. Professional Practice Principle

9.1. Candidates are committed to continue to learn and improve their practice throughout their teaching career.

Perhaps you can tell I believe in life-long learning by the fact that I am still in school at 35? Because I have a Master's degree in biology, I could have continued to adjunct or taught full time at community colleges without getting a teaching certificate, or any training in education for that matter, I decided I would rather make sure that I was doing things well, so I enrolled at Warner.

My Co-operating teachers attest to my interest in continuing to educate myself. Peter Kalenda writes:

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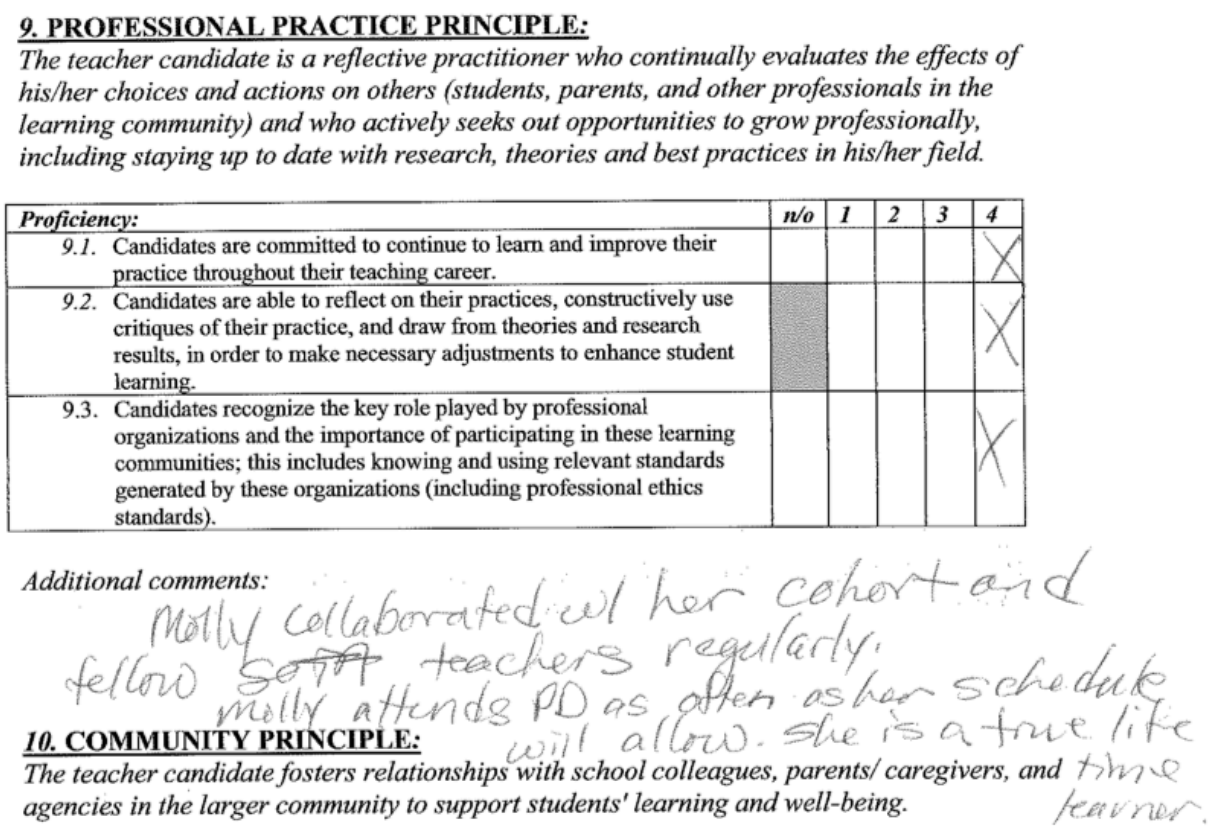

9. PROFESSIONAL PRACTICE PRINCIPLE:
The teacher candidate is a reflective practitioner who continually evaluates the effects of his/her choices and actions on others (students, parents, and other professionals in the learning community) and who actively seeks out opportunities to grow professionally, including staying up to date with research, theories and best practices in his/her field.

Proficiency:	*n/o*	*1*	*2*	*3*	*4*
9.1. Candidates are committed to continue to learn and improve their practice throughout their teaching career.					X
9.2. Candidates are able to reflect on their practices, constructively use critiques of their practice, and draw from theories and research results, in order to make necessary adjustments to enhance student learning.					X
9.3. Candidates recognize the key role played by professional organizations and the importance of participating in these learning communities; this includes knowing and using relevant standards generated by these organizations (including professional ethics standards).					X

Additional comments:
Molly collaborated w/ her cohort and fellow ~~staff~~ teachers regularly. Molly attends PD as often as her schedule will allow. She is a true life time learner.

10. COMMUNITY PRINCIPLE:
The teacher candidate fosters relationships with school colleagues, parents/ caregivers, and agencies in the larger community to support students' learning and well-being.

9.2. Candidates are able to reflect on their practices, constructively use critiques of their practice, and draw from theories and research results, in order to make necessary adjustments to enhance student learning.

I am able to reflect on my practices, and constructively use critiques of my practice in order to make the necessary adjustments to enhance student learning. This is evidenced by the daily reflective discussions I held with both of my co-operating teachers and exemplified by the written plusses and arrows from Peter Kalenda each day/period. Between periods I would listen to/read the recommendations and make adjustments as possible. Sometimes this just involved changing my wording. Sometimes I re-designed PowerPoint™ presentations. Sometimes I added more visual cues to my lesson. I almost always took my co-operating teachers' advice in an effort to improve my practice.

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We also included this reflective practice in our Unit Analysis. I kept a journal in which I wrote down thoughts about my lesson implementation each day. I also wrote up my reflections after every lesson in my Warner Lesson Plan. For Example, you can see all my reflections from our evolution unit.

9.3. Candidates recognize the key role played by professional organizations and the importance of participating in these learning communities; this includes knowing and using relevant standards generated by these organizations (including professional ethics standards).

I recognize the key role played by professional organizations and the importance of participating in these learning communities. To this effect, I attended the Central Western Section of Science Teachers Association of New York State (STANYS). Specifically, I attended the workshop on stream monitoring:

#2 Finger Lakes Stream Monitoring Network (8-12)

Sheila Myers, Finger Lakes Institute and CWS Environmental SAR and Jordan Youngmann, *Finger Lakes Institute, Hobart and William Smith Colleges*

Have you ever wanted to conduct stream monitoring but were not sure how? Are you currently conducting stream monitoring with your students but feel you are doing it in a vacuum? Come to this session to learn how to get involved with your students in an on-line network of schools that are monitoring stream sites in the Rochester/Finger Lakes region. You will be introduced to the concepts behind stream monitoring, how the network works, and what it involves for your participation. All schools involved will receive free training, access to an on-line database of stream monitoring data (chemical, biological, and physical data), and equipment to conduct the monitoring. We will even show you where stream sites are located in the region that allows public access.

Because this presentation was so close to my research expertise, I introduced myself to the speaker and offered to volunteer for the organization. He seemed very pleased with the idea and suggested that I could be the point person for training teachers in Rochester. I have since contacted him and am waiting to hear back.

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From: Molly Gildea
Subject: **STANYS**
Date: June 8, 2011 12:31:21 PM EDT
To: youngmann@hws.edu

Show in Mailbox

Dear Jordan,

Things have finally slowed down at school and I thought I would get in contact with you about The Finger Lakes Stream Monitoring Network.

I introduced myself at the STANYS workshop at Nazereth in Rochester in February. I used to work at USGS doing stream ecology in Seattle, WA. You mentioned that you might have some volunteer work that i could help you with.

I just wanted to send you my address and let you know that I am still interested.

Sorry I am so slow about it...

Thanks,
Molly Gildea

In addition, I worked with my fellow Noyce scholars at Warner to create a presentation for the annual Noyce conference at the National Science Foundation in Washington, D.C.. I did not attend the conference, but we worked as a team to produce the presentation. Steve Johnson gave the presentation. Here is the abstract from the conference program:

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4.14 Facilitating Student Reflection Through Self-Assessment

Length of Session: 60 minutes

Constance Smith, Warner Graduate School of Education, University of Rochester, csmith@warner.rochester.edu
(Presentation developed by University of Rochester current Noyce Scholars: Stephen Johnson, (Presenter), Marshall Hunter, Harvey Williams, Molly Gildea, and Tyler Lucero)

Target Audience: Undergraduate and/or Graduate Noyce Scholars, Noyce Teaching Fellows, Project PIs, Co-PIs, Other Faculty/Staff
Topic: Resources for Teachers

Student-directed exploration holds a prominent place in the curricula of reform-minded educators. However, the conceptual shifts that constitute real learning can only take place when learners take time to consider their experiences in a broader context. As John Dewey (1933) stated, "We do not learn from experience, we learn from reflecting on experience." Moreover, recognizing the outcomes of experience can serve to reinforce the value of learning in our minds and encourage further inquiry. Life-long learners take time to make meaning from experiences through reflective practices. It follows that a teacher with the goal of cultivating life-long learners should create an instructional space that encourages students to develop reflective habits.

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I intend to remain actively involved in STANYS and with the Noyce Scholars program at the University of Rochester, Warner School. This includes participating in the Get Real Science Professional Development Model for Noyce Scholars in the fall of 2011.

I am also a member of the National Science Teachers Association and read their mailings.

10. Community Principle

10.1. Candidates value and seek out parental and community involvement.

Over the summer we heard a lot about how isolating teaching is, and how we need to fight this. Although I had been completely isolated teaching at Finger Lakes Community College, I had not fully considered what that meant for a high school teacher. I just assumed that since I was in a school, I would see other people. I am surprised to find that it is very easy to not see anyone other than students for an entire day.

However, my co-operating teachers both mades an effort to interact with other teachers in their respective schools, and maintain strong working relationships with several. In addition to being my co-operating teacher, Lawanda Brown is a mentor to two other first year teachers at the school, and works hard in this role to solve some problems that they are having. She is also the union representative. I have a very good example in her for building and maintaining relationships within the school and beyond.

This comes naturally to me. I have had several previous jobs in which I formed strong relationships with my co-workers and have maintained them to this day. They are still important for keeping up on science, getting references, and for possibly re-entering research in the future.

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These connections have enabled me to add depth and personal, local connections to my lessons. For example, when Theresa and I were designing our evolution unit, we consulted with an evolution professor, Dr. Bob Minckley, in the UR Department of Biology. He made several suggestions to our plan that we took into account. We also used data from Dr. Richard Glor's research when presenting the concept of adaptive radiation. When our students put together a timeline of the concept of evolution, I suggested we include a local (and very famous) evolution researcher, Dr. Allen Orr. The students were amazed that he was alive (!) excited to hear that he worked close by, but more amazed that I knew him. These professional connections in the community will continue to help me keep up to date in the field of biology, and bring in expert advice on many topics. I have many personal connections to professors whom I could ask to give presentations to my students.

I am also a parent. I believe that this gives me added empathy when speaking with parents about their children and will help me maintain positive relationships with parents. I know how much I want to know what my children are doing at school and have been very happy with the classroom blog that both of my children's teachers keep. I would like to incorporate this into my communication methods with parents. I would also like to produce a monthly newsletter with some information about the lessons their students have been working on.

10.2. Candidates are able to communicate effectively with parents/caregivers and colleagues.

NSTA standards:	*1*	*3*	*4*
10.d Candidates interact effectively with colleagues, parents, and students; mentor new colleagues; and foster positive relationships with the community.			

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At NWCP I participated in two parent/teacher conferences. The first was mostly positive and scheduled. The second was impromptu due to a disciplinary problem. During the second, I was able to communicate the events that had occurred effectively without straining my relationship with the mother of the daughters involved. I also made a positive phone call home and reported on it.

At SOTA we communicated weekly with parents through progress reports. These reports included the students' class participation, homework, and quiz grades for each week. They alerted parents to missed assignments and offered the parents a place to comment. Students were required to return the progress report with a parent signature for credit. The vast majority of students turned them in and many parents took advantage of the space to ask questions, make comments, and request phone conferences. We responded to every phone conference request or emailed replies to their questions. This maintained a regular flow of information between the families and us. This is verified by my evaluation from Peter Kalenda:

***10.* COMMUNITY PRINCIPLE:** will allow. She is a true in
The teacher candidate fosters relationships with school colleagues, parents/ caregivers, and him
agencies in the larger community to support students' learning and well-being. learn

Proficiency:	*n/o*	*1*	*2*	*3*	*4*
10.1. Candidates value and seek out parental and community involvement.					X
10.2. Candidates are able to communicate effectively with parents/caregivers and colleagues.					X

Additional comments:
Molly communicated weekly w/ parents via a progress report. She also called home as needed.

In addition to communicating effectively with parents and researchers in the field, I maintained positive communication with my colleagues at both of my placements and in my

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GRS cohort. I had a very productive working relationship with my co-teacher, Theresa Milano.

She, Peter Kalenda and Jo Ann Morrealle can verify this.

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