TEACHING AND LEARNING PORTFOLIO

by

Jenny Arens Gubbels

February 2009

This portfolio submitted in partial fulfillment of the requirements for the Delta Certificate in Research, Teaching, and Learning.

Delta Program in Research, Teaching, and Learning
University of Wisconsin-Madison

The Delta Program in Research, Teaching, and Learning is a project of the Center of the Integration of Research, Teaching, and Learning (CIRTL—Grant No. 0227592). CIRTL is a National Science Foundation sponsored initiative committed to developing and supporting a learning community of STEM faculty, post-docs, graduate students, and staff who are dedicated to implementing and advancing effective teaching practices for diverse student audiences. Any opinions, findings and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

For more information, please call us at 608-261-1180 or visit http://www.delta.wisc.edu.

2007

Table of Contents

I. Introduction and Statement of Professional Goals. 4

II. Teaching in the Classroom. 7
- a. Introduction: Teaching-as-Research. 7
- b. Teaching Philosophy. 8
- c. Natural Killer Cell Lesson Plan. 10
- d. Delta Internship Final Report. 12
- e. Delta Internship Reflective Statement 21
- f. Artifact: Sample Wiki Page. 22

III. Teaching in the Research Lab.. 24
- a. Introduction: Creating a Learning Community. 24
- b. Mentoring Philosophy. 26

IV. Teaching in the Community. 27
- a. Introduction: Learning-through-Diversity. 27
- b. Artifact: Slides from Expanding Your Horizons Conference. 29
- c. Artifact: Fusion Science Theater brochure. 31

V. Summary. 33

VI. Acknowledgements. 34

Appendix I: CV. 35

I. Introduction

Welcome to my Teaching and Learning Portfolio. This document is both a reflection upon the experiences I have had thus far as an educator, as well as a set of expectations for myself as to what I would like to achieve. Delta has been instrumental in introducing me to the intricacies of teaching and ways to implement the three pillars of Delta (teaching-as-research, learning communities, and learning-through-diversity) into how one functions as an educator. While reflecting upon the teaching experiences I have had in my time at UW-Madison, I can clearly see my teaching experiences falling into three different categories: teaching in the classroom, teaching in the research lab, and teaching in the community. These three venues are unique and require different skill sets and considerations, yet, they all share the core pillars of Delta in that each has a component of teaching-as-research, learning communities, and learning-through-diversity. Although each pillar can be found within each of these different teaching venues, my experiences thus far have let me to recognize certain pillars more strongly in certain experiences compared to others. For example, I see teaching-as-research to be an inherent part of teaching in the classroom, and it is in this venue where I carried out my Delta Internship project which was a wonderful opportunity to learn how to properly conduct teaching-as-research. Through my experiences of teaching undergraduates in the research lab, I learned the power of learning communities and helped to form a learning community for the undergraduates I was mentoring. In addition, I participated in a learning community with other graduate student mentors across campus. It was during this experience that I wrote my mentoring philosophy. Lastly, my commitment to teaching science in the community reflects my belief that all people, regardless of sex, race, or socioeconomic status, deserve a quality education and should have equal access to knowledge. A diverse group of people enhances and contributes more to a body of knowledge as a whole, therefore, everyone should be invited and encouraged to participate in contributing to the world's body of knowledge. It is in this section that I expand on my ideas of learning-through-diversity.

I begin the portfolio with a "Statement of Professional Goals," in which I describe how I see teaching in these areas interconnecting as I begin my career as a professor at a small liberal arts college (Augustana College, Sioux Falls, SD). The following sections of my portfolio are evidence of what I have achieved thus far in teaching in the classroom, teaching in the research lab, and teaching in the community, and each section also contains a reflection of how at least one of the Delta pillars are manifested in each one. Thank you for reading, and enjoy!

Statement of Professional Goals

At the completion of my professional career, I want to be able to reflect upon what I have achieved and know that I have excelled at teaching in three areas: in the classroom, in the research lab, and in the community. These three goals are intertwined, and as I strive for excellence in each, the accomplishments I achieve will supplement and improve the others.

Teaching in the Classroom

I am clearly focused on utilizing and improving upon the teaching skills that I have already learned in my graduate training. The Delta Program in Research, Teaching and Learning has given me many tools and resources which will help me refine my teaching skills. These strategies include active learning activities, assessment techniques, and reflective teaching practices. I have been able to implement these

skills as a Teaching Assistant for physiology, a co-facilitator for a discussion-based course, and in the daily interactions with undergraduates in our lab. Like research, teaching is an ever-changing process. I look at my teaching practices through the lens of a researcher. I ask questions (*have the students successfully learned this concept?*), I develop an experiment to test the answer (formulate an appropriate assessment) and based on the results and previous literature, make a plan to move forward (change the lecture or add an activity to clarify a concept). These methods will also help me to successfully develop new courses while relying on the expertise of other faculty. I have had the luxury of consulting with other fine educators on ideas and strategies to improve student learning, and look forward to continuing this collaborative approach to education throughout my career. Additionally, I hope to return the favor as I gain more and more experience by providing mentoring to others as they begin their teaching careers. My goal is to excel at teaching in the classroom by constantly looking for ways to improve my techniques to achieve the best learning outcome.

Teaching in the Research Lab

One of the best ways to learn something well is to put learned ideas into action. The process of engaging in research requires physical action, and is thus a valuable learning opportunity. It is in the research lab where concepts from a textbook come to life and become real. These learning opportunities can be greatly enhanced if the student has a good mentor who is willing to take the time to explain not just the "how" of an experiment, but the "why". Knowing the significance of experiments and understanding how this work might one day help society can give students a sense of ownership and accomplishment in the lab. Through research, I hope to instill a life-long fascination for science in undergraduate students. I will engage in projects that are meaningful and relevant. These projects will contribute significantly to knowledge in the area of ovarian cancer, so that not only will the students gain a great learning experience, but together we will make a contribution to science.

Teaching in the Community

Because I had the benefit of various people in my life encouraging my excitement about science, I have a deep commitment to informal science education and engaging students of all ages in science. My experience includes founding an after-school science program for 5th graders at an underprivileged school during my undergraduate career at Loras College. It was so inspiring to see their excitement about science and truly humbling to be someone they looked up to. One of the goals in my new position at Augustana College is to start an organization on campus called "Fusion Science Theater," which will be accomplished with the guidance of Dr. Holly Kerby at Madison Area Technical College. This group will perform interactive skits for school-age children that are specifically designed to help children understand how scientists ask questions and conduct experiments to find the answers. I want to encourage both undergraduate students and school age children to develop a passion for asking questions, seeking answers, and getting excited about finding knowledge. I hope that this will lead to them taking an active role in their own education and a realization of the doors it can open. For the undergraduate students that participate in this group, it will provide a chance to be a mentor and a role model for children, which can be a very gratifying and humbling experience.

I am aware of the challenges that I will face in balancing these three aspects of my career; however I believe that I am capable of successfully accomplishing this delicate balance. Each environment presents with its own challenges, however, lessons learned in one area can help improve the others.

The knowledge I have gained in Delta and an awareness of how the pillars are relevant in each venue will help me to constantly improve the way I teach in these three areas. Striving for excellence in these areas is yet another journey upon which I will continue to learn and grow.

II. Teaching in the Classroom

a. Teaching-as-Research

Teaching-as-research is the application of the scientific process to improve learning outcomes. The teacher must first have the awareness to know what material students struggle with. Then he or she reads the literature to see how others have solved or tried to solve similar problems. A plan to improve learning outcomes with an appropriate assessment to measure the end result is formulated. The plan is implemented and then the teacher analyzes the results from the assessment in order to know if the plan was successful. If not, something within the plan must be changed and the process begins again. This is almost exactly akin to how a researcher plans and formulates an experiment, carries out the experiment, and then analyzes and interprets the data.

This section compiles the work that I have done while teaching in the classroom and puts into action my definition of teaching-as-research. It consists of my Teaching Philosophy and a lesson plan I developed while taking the Delta course, "The College Classroom: Liberal Arts, UW System, and Tech Colleges" that uses an active learning strategy. It is in the classroom that I have utilized what I have learned about teaching-as-research. As evidence of my experience with teaching-as-research, I have also included my Delta Internship Final report, reflections, and an excerpt from the wiki that I created for that internship. This internship was conducted under the guidance of Dr. Janet Branchaw, whom I first met while I was taking the Delta course, "Teaching with Technology." It was in this course that I first learned about wikis and implemented the use of a wiki in Dr. Branchaw's section of the Entering Research course. For my internship project, I expanded on the idea of using wikis for peer feedback in the Entering Research course and turned it into a teaching-as-research project. My reflection upon each of the Delta pillars after the completion of this internship project comes at the end of this section.

b. Teaching Philosophy

Seeing the look on a student's face when at the dawning of an "aha!" moment is priceless. It is in that instant in which two previously unrelated bits of knowledge in the brain are suddenly connected: a bridge is formed, a concept understood, and a piece of the puzzle is solved. As a professor of biology, my ultimate goal is to make these moments a common occurrence for the students in my class. There are several strategies to help students make these connections. I believe that enthusiasm for the subject matter, development of students' writing skills, and flexibility to adapt to students' learning needs are key components to fostering an environment where "aha!" moments are commonplace.

Enthusiasm is contagious. I am fascinated by the science world, especially the study of cell biology and physiology. By connecting science to personal experience, and developing connections between classroom work and the real world, I will perpetuate enthusiasm for the subject matter. Creating a diverse learning community in my classroom is one of my major goals in teaching. To do this, I will use real-life examples to help the students relate the subject matter to his or her own personal experience to create a feeling of ownership. When students take ownership of their learning, they become responsible for learning the material, and will hopefully develop an interest in some subjects that will extend beyond the classroom. Group work will be a common activity in my classroom, and in these groups students will draw on each other's experiences and knowledge to solve problems and learn together.

Different people have different learning styles, therefore, in order to help everyone learn effectively, I will use diverse approaches to teaching. One of these approaches is active learning. Active learning is one way in which students can attain ownership of the material, engage in it in a physical way, and share this experience with others. In order to do this, I will use several active learning tools that I have encountered through my participation in Delta, a Teaching and Learning program at UW-Madison. Think-pair-share activities, group work, "act-outs," concept maps, and other activities will be used to learn and solidify concepts. For example, one lesson plan that I have developed for a Delta course includes having students "act-out" how the immune system would attempt to eliminate a cancer cell, with the students themselves acting as the different cell types.

Writing will also be an integral part of my classes. Through personal experience and my years as a writing tutor, I feel there is no better way to understand a topic fully unless one is required to organize his or her thoughts and write them down in logical succession. Writing skills in science are essential to communicating ideas to other scientists and the public. Developing these skills by writing scientific reports and one-minute papers will help students hone their critical thinking abilities as well as increase learning about specific topics. This technique ensures an open flow of communication between professor and student.

I believe teaching is an evolving process that is based on, and shaped by, student learning. By using student surveys as well as different forms of assessment, I will be discerning what kind of teaching strategy works best for the students. By implementing teaching-as-research strategies that apply research skills to approaching learning problems, I will improve my teaching skills. This will also enable me make the most conducive learning environment for my students. I will encourage students to come to me with any problem they may be having with the class. Listening to students' concerns, evaluating their assessment scores, searching the literature about that particular learning issue, and then

implementing changes to address those deficiencies in the coursework is how I plan to evolve and improve my teaching methods.

As an educator, I have a responsibility not only to my students, but to society as a whole. I am committed to encouraging students to take a more informed view of the world around them, and in the process, helping them to become knowledgeable and creative contributors to society. I want them to learn to follow their passions, find new connections between ideas, and forge new frontiers. Ultimately, I want my students not just to experience the "aha!" moment—but learn to seek it out.

c. Natural Killer Cell Lesson Plan

This lesson will be towards the middle of an Immunology course. By this point, students have a firm grasp on innate vs. adaptive immunity, and are familiar with the different cell types in the immune system and their roles. This lesson focuses specifically on natural killer cells and their role in immunity.

1. Title/Concept: Natural Killer cells are members of the innate immune system and identify and kill target cells through a balance of activating and inhibitory receptors.
2. Learning Goals: Understand and appreciate the role of NK cells within the immune system.
3. Learning objectives
    a. Explain how an NK cell identifies and kills target cells.
    b. Compare and contrast some of the activating and inhibitory receptors on NK cells, and their ligands.
    c. Describe the role of NK cells in the immune response and understand in general how T cells, B cells, and NK cells work together to fight different infections.

4. Resources and Materials
    a. Power Point
    b. Act-out activity scenarios
    c. Rubric handouts

5. Opening Activity
    a. Think-Pair-Share—turn to your partner and tell him/her what is innate immunity and name the cells involved in innate vs. adaptive immunity.

6. Concept Activity/Task
    a. Powerpoint slides on NK cell background, activating/inhibitory receptors, killing process, ect.
    b. Act-outs: each team of four has five minutes to prepare a 2 minute act-out with their scenario. After the presentation, the class will evaluate each team on the accurateness of the act-out using a rubric scale. If time, we will have a discussion afterwards, but each team will only have 5 minutes maximum for the act-out and discussion.

7. Assessment
    a. To be completed when the students present their act-outs. Grading rubric for act-outs will be used that will evaluate both the accuracy of the performance to concepts we have learned in class as well as creativity. The students and instructor will evaluate the act-outs.

8. The Performance

The students in each group will decide who will be each of the following players:

Target Cell
T cell
B cell
NK cell

Each group will then be given one of the following scenarios:

1. An NK cell comes into contact with a bacteria (target cell).

2. A T cell encounters a target cell that is expressing MHC class II.

3. Because of factors in the surrounding environment, an NK cell has downregulated NKp46, an activating receptor, from its cell surface. It encounters an MHC class I negative target cell.

4. A B cell encounters a target cell that has been infected with the HIV virus.

At the beginning of the performance, each group will announce their specific scenario. During the performance, they must show how the two cells stated in the scenario initially interact with each other. After the initial interaction, the students must accurately portray how the other cells in the group are then activated (or not activated) to come to the aid of the first cell that originally encountered the target cell.

The first time I do this activity, students will, at the beginning of the period, be given a non-graded pop quiz about their understanding of how immune cells work together to fight infection. We will then continue with the activity. After the activity, I will give them another quiz that tests the same concepts as the first, in order to see if they have improved their understanding. In addition, I will give the students a survey to see what they liked and didn't like about the activity, as well as any suggested changes they might have. I will use these pieces of data to change and reformulate this activity for the next semester. This is just one example of how I will use teaching-as-research in my future classroom.

The following is my Delta Internship Final Report. This report is the result of a semester of putting teaching-as-research into action. This report outlines the problem, the assessment, and the data that was collected. It also includes reflections about each of the Delta pillars. At the very end is an excerpt from the wiki that I developed for this course as a demonstration of the conversations between students and faculty that came about because of the wiki.

d. Delta Internship Project Final Report

Introduction

An integral part of effective teaching depends upon creating a collaborative learning environment for students in order to encourage them to learn together and from each other. Students can interact together inside the classroom, but a great deal of learning also occurs outside of the classroom. Before the internet, students would have to physically meet in order to collaborate and learn from each other. Technology, however, is making out-of-the-classroom learning communities more convenient by eliminating the need for physical proximity. One way in which to utilize the internet for creating virtual learning communities is via the wiki. Wikis are tools where students can post projects or papers on individual pages, and then other students can view these posts and comment on them. This creates an environment where students learn from one another by seeing what others have posted, commenting and reflecting on it, then going back and reflecting on their own work. **This project aimed to determine if wikis can increase the quality and usefulness of peer feedback on research abstracts**.

For this Delta Internship project, I, along with my mentor, Janet Branchaw, incorporated a wiki into the Entering Research course at UW-Madison. This course is designed for undergraduate students in biological sciences research labs. For most of these students, this is the first time they have been involved in research. The goal of this class is to create a forum where they can hear about other's experiences, learn about the world of research, and get a deeper understanding of the research their group does by making a poster to present at the Undergraduate Research Symposium (URS) at the end of the semester. The abstract that is sent to URS goes through several revision cycles. The students are expected to provide feedback on their peer's abstracts; however, in previous semesters, student feedback has not been very extensive, nor is it always very useful. Previously, peer feedback had been given in class, mostly by the facilitator. It is our hypothesis that by putting the abstracts on the wiki and providing a rubric for feedback, students will have more time to provide feedback and think more carefully about that feedback. It provides a place where both the rubric and the abstract being critiqued are in the same place to be accessed at the same time. In addition, instructors can model good feedback on the wiki, thereby providing an example of quality constructive feedback. The goal of this project was to increase the quality of peer feedback by modeling good feedback, and providing instruction for giving quality feedback in the same space where the feedback is to be given.

There were several challenges in implementing this plan. The most difficult obstacle was the fact that each of the three sections had different facilitators, and I was not able to facilitate any of the sections. Therefore, I had to rely on others to implement my plan. In addition, the different facilitators taught differently and followed a slightly different schedule; therefore, timing was not always identical between the two groups (one section used a wiki, the other two did not). I had originally planned to evaluate the student's final posters as a way to assess the effectiveness of the wiki. However, with the way the

facilitators taught their sections, this was not possible, and the timing did not work out. Another challenge was managing the wiki itself. Students were unfamiliar with how to use the wiki and had many issues with technicalities relating to the posting of their abstracts and posters, which I did not expect. I was fortunate to have the assistance of another facilitator who was extremely helpful in combating some of these issues, however, some issues I was unaware of until after the semester, simply because I was not facilitating the wiki group.

Literature Review

Others have also tried to increase the quality of peer feedback in their classrooms. Guilford assigned students to review fellow student's papers in a format akin to the scientific article review process (1). He provided a rubric for students to follow when giving feedback. Therefore, we decided to incorporate a rubric on the wiki as well. Peer review has been shown to be useful for students because it allows students to reflect on the quality of their own writing and the writing of their peers (2). Peer review allows students to learn on three levels: 1. during writing, 2. while reading opinions of others, and 3. through the subsequent process of self-assessment/reflection, thereby fostering deeper learning (2). In addition, through this process students become more aware of how science works in the professional world, and will familiarize themselves with the peer review processes that are an integral part of accepting abstracts for meetings, publishing journal articles, and awarding grants.

Wikis have also been used in teaching and learning. A teaching wiki found at http://hscs.wikispaces.com/WSL+Collaborative+Authoring provides ideas about how to incorporate wikis into student projects (3). Using wikis to give peer feedback is just one way that teachers are using this online tool. Other uses include making an online glossary, group work, collaborative assignments, or exam reviews. Wikis can be very effective methods of allowing students to work collaboratively in a variety of ways outside of the classroom. One Boston College professor has put his whole textbook on the wiki, and encourages students to ask him questions that he will then ask on exams. Students also post papers on the wiki for peer review before handing them into the professor which helps their final grade (4). Dr. James Coyle, PhD in educational psychology, wrote a dissertation on the differences between collaborating in groups using a wiki vs. face-to-face (5). He found that there were no significant differences between the quality of the final reports between the wiki group and the face-to-face groups, which shows that wikis can be used effectively in group work. In addition, there was no significant difference in the sense of community and learning felt by the members of either group (5).

Teaching-as-Research Strategy

a. We addressed the issue of improving quality of peer feedback of student's posters by providing an online forum (in the form of a wiki) for students and facilitators to leave feedback. Students were given a handout and a tutorial on how to use the wiki. Students were assigned to leave feedback to two other students, using the rubric provided on the wiki. One section of this course used the wiki, and two sections did not; the number of students in each group (wiki vs. non-wiki) was 9 to 6. The non-wiki sections were given the same rubric on how to give peer feedback, however the feedback was given in written form over the same time period. For example, if the wiki section held class on Tuesday, they were assigned to put their abstract up on the wiki by Friday. Two peers were assigned to leave feedback for each person by Sunday night. The student was then to respond to that feedback by Tuesday at noon. The facilitator was also to

leave feedback for every student by Sunday evening. In contrast, the non-wiki group with class on Tuesday put their abstracts up on Learn@UW, the students printed them off, then wrote written feedback using the rubrics. The wiki group could therefore see their peer's feedback, as well as the feedback of the facilitators, and could use this feedback as a model for their own. In addition, the wiki group also had the advantage of looking at the feedback that was given to them and responding to it before class, therefore, they were better prepared to discuss their abstracts during class.

b. One of my biggest challenges was that I was not the facilitator for the section that had the wiki. Therefore, I had originally planned to be the go-to person if the students had technical difficulties or needed extra help with grammar or vocabulary if they were an ESL student, however, they felt understandably more comfortable going to their facilitators for those types of issues. I did not find out until after the class was completed that many students had difficulty posting things on the wiki and that the facilitator was posting many items for them. This was certainly not my intention to make extra work for the facilitator, and, had I known this, I would have taken steps to remedy it.

c. The foundation of the class is based on creating a learning community in the classroom that lets students share their lab experiences with each other and creates a comfortable environment to talk about science. The wiki extended this community to outside of the classroom and allowed students to communicate with each other in another way and to take the time to provide quality feedback to their peers. In the beginning of the semester, the students made comments on the wiki outside of their peer feedback assignments, and the wiki did become a discussion board of sorts. However, as the semester wore on, there were fewer assignments that revolved around the wiki, and it was not used as much. Therefore, a virtual learning community was initially created and facilitated the student's building relationships with one another and learning about each other's research projects. However, this community was not sustained throughout the semester.

Assessment

We assessed the effectiveness of the wiki in two ways: 1. scaling of peer feedback given in both wiki and non-wiki groups and 2. a survey that asked specific questions about the usefulness of peer feedback from both groups and the effectiveness of the wiki from the wiki group. In order to determine if having students provide feedback on the wiki as opposed to paper copies improved the quality of this feedback, written paper feedback obtained from the control group and all of the comments provided on the wiki were evaluated and scored according to Bloom's Taxonomy. This type of assessment was chosen because one of our main goals was to improve the quality of the feedback, therefore, rating the feedback for quality using a standard rubric (Bloom's Taxonomy) was a way to gather this information.

The students were given a rubric to follow for both the written and the web-based feedback (see Appendix 1). This rubric allowed students to rate each other on several components of the abstract, including introduction, methods, and conclusions. Students used a number rating scale to give their peer a rating as well as space provided for additional comments (scored using Bloom's Taxonomy).

The survey was given to the students after they had completed the course and was part of a larger survey that asked questions about the course as a whole. We asked three main questions: Would you

recommend using wikis in this class in the future? Did using the wiki increase the quality of peer feedback that you received on your abstract? Did you feel better connected to your fellow students because of the wiki? These questions were chosen in order to see if the students felt that the wiki was a worthwhile tool in this class.

Results

Although the number of students in each section (wiki vs. non-wiki) was comparable (9 students and 6 students, respectively), almost twice as many comments were left on the wiki (102) compared to written comments (58, Figure 1). In addition, ratings of the quality of the feedback using Bloom's Taxonomy resulted in a greater number (12 compared to 4) of 3, 4, and 5 ratings from the wiki feedback compared to the written feedback (Figure 1). Therefore, the comments on the wiki were more numerous and some were slightly more thoughtful.

Students in each section were asked to complete a survey at the completion of this course. Unfortunately, only 6 students actually completed this survey, all of whom were in the wiki section. Students were mostly neutral about whether or not the wiki should be used in the future and if it made them better connected to their fellow students (Figure 2). Students mostly agreed, however, that the use of the wiki increased the quality of peer feedback that was given regarding their abstracts (Figure 2).

Discussion

We compared feedback completed by students on a wiki vs. written. This feedback was given in rubric form with additional space for comments. We found that students who were provided with a wiki left more feedback than their non-wiki peers, and in addition, this feedback scored higher using Bloom's Taxonomy. Out of the 102 comments that were left on the wiki, 12 of these scored a 3, 4, or 5 on the Bloom's Taxonomy Scale (11.7%). In comparison, 4 comments out of 58 scored higher on the Bloom's Taxonomy scale in the written feedback group (6.8%). There could be several reasons for these differences. Firstly, the wiki is always accessible, so students would have had many opportunities to read their peer's abstracts and make comments. This increase in time spent reading the abstracts then perhaps allowed for more thoughtful comments beyond merely superficial remarks about length, grammar, or "I don't understand this." However, if time was the reason why there were more numerous and thoughtful remarks, facilitators could give the students longer to evaluate their peer's abstracts on paper copies. A wiki would not be necessary.

Another reason for the difference in feedback could be that students using the wiki could see and model the facilitator's feedback. This is a component of the wiki that could not be easily replicated with paper copies of abstracts given to students, as the time component would be.

Therefore, there are several aspects to the wiki that could be contributing to the feedback differences. In order to make it absolutely clear that the components of the wiki were the reason that there was an increase in peer feedback quality, a larger sample size must be used (in order to achieve statistical significance) and facilitators should make better use of the wiki. Better wiki training for both students and facilitators would be needed, as this was a problem in this study. To make the wiki as effective as possible, students must have a reason to go to the wiki every week. This would increase student's familiarity with the wiki and encourage them to comment on anything they see posted. This would

mean a large amount of work for the facilitator because as the class is taught now, most everything the students need is on Learn@UW, and it would now have to be transferred over to the wiki. Additionally, not many people are familiar with how a wiki works, and facilitators (who may be different with each semester) may not want to spend time learning a new technology. Therefore, while I do believe that the wiki can have very useful teaching applications; for this course it may not be practical to use the wiki for only increased quality feedback purposes. There may come a day when wikis are a tool that are used by everyone, and in that case, students and facilitators would not need to spend as much time learning the technology. It could then be used with virtually no training and it would make more sense to use it for this course.

Lessons Learned

The main lesson I learned in doing this study is that logistics are essential for a successful teaching-as-research project. If I were to repeat this project, I would be the facilitator for both the wiki and non-wiki sections in order to ensure that the control and test groups were as similar as possible. I would also take a wiki information course so that I wasn't blindly teaching the students how to use a wiki, because I was doing a lot of learning about it as I went. Another change would be to incorporate the wiki into more aspects of the course. I believe that this would increase the amount of times students would log in to the site, and thus increase the chance that they browse within the wiki and make comments on other students' pages. This would mean getting rid of Learn@UW for the official course website, as students clearly have stated that they do not want two different places to go on the web for one course. This would be a large amount of work for the facilitator, however, to maintain the wiki instead of Learn@UW for this course.

The students liked the idea of a wiki, and they did participate fairly well. I was surprised that initially there was activity on the wiki that was not assigned, however, this activity faded out as the semester continued. After the semester, a conversation with one student revealed that they found the wiki frustrating and confusing, as she and other students could not get it to work. I was extremely surprised by this comment, as I did not know that students were having trouble posting comments and their abstracts on the wiki. Had I known this, I may have been able to help, but this was not communicated to me by the facilitator. Again, being the facilitator for both sections would have helped with this problem as well.

Conclusions

The learning goals for the students were to improve their ability to provide quality peer feedback. Although the data are promising, in order to be conclusive this study needs to be repeated with a larger number of students. It would also be helpful to manage the wiki more efficiently in a way that makes it more user-friendly for both students and facilitators. Although the data presented here reflects the positive results in the literature that corroborate the idea that wikis can be useful tools in the classroom, for this course they may not be practical until students and faculty in general are more comfortable with using wikis.

Literature Cited

1. Guilford, W. H. Teaching peer review and the process of scientific writing. Advan Physiol Educ, *25:* 167-175, 2001.
2. Poronnik, P. and Moni, R. W. The Opinion Editorial: teaching physiology outside the box. Adv Physiol Educ, *30:* 73-82, 2006.
3. WSL Collaborative Authoring. [Online]. Accessed January 6th, 2008. http://hscs.wikispaces.com/WSL+Collaborative+Authoring
4. Haverstein, H. Wiki becomes textbook in Boston College classroom: IT prof says Web 2.0 boosts collaboration among students. [Online]. Accessed February 1, 2008. http://www.computerworld.com
5. Coyle, J.E. Wikis in the College Classroom: A Comparative Study of Online and Face-to-Face Group Collaboration at a Private Liberal Arts University. [Online]. Accessed February 4th, 2009. Doctoral Thesis. Kent State University College. May 2007. http://www.ohiolink.edu/etd/send-pdf.cgi/Coyle,%20James%20E.,%20Jr..pdf?acc_num=kent1175518380

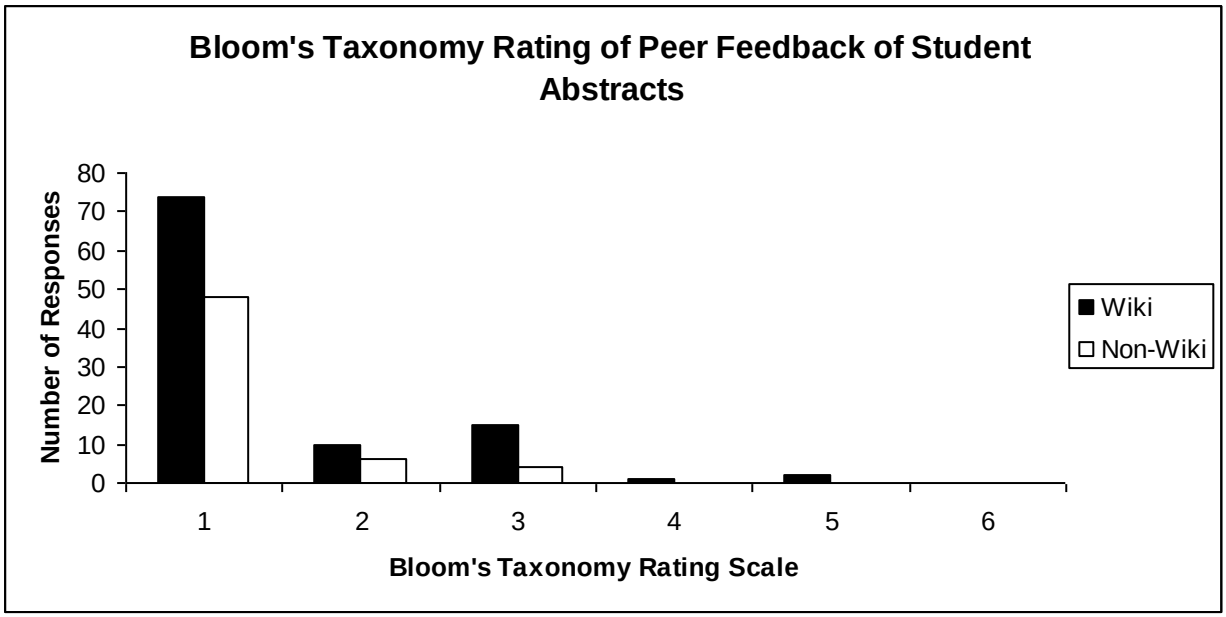


Figure 1.

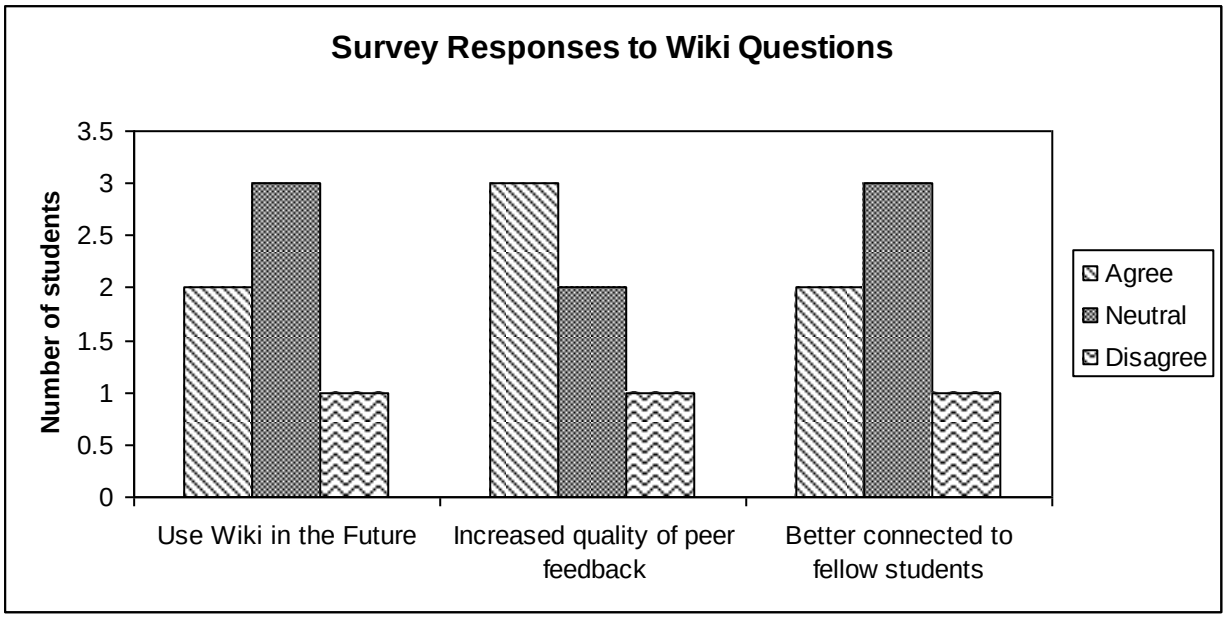


Figure 2.

Appendix 1

Abstract Peer Review Form

Reviewer: _____ Author: _____

As a reviewer (*in your own words*), summarize what this research project is about and why it is important.

Evaluation Rubric:

	1	2	3
Title & Authors	Absent or not clear	Present, but missing an author, or title is unclear and/or too long	All authors listed and title is brief and informative
Introduction (Background, context and relevance**)**	Absent or not clear	Incomplete presentation of relevant background information, or relevance not clear	Research is presented as a logical and relevant next step based on background information
Hypothesis or Research Question (purpose or aim/goal)	Absent or not clear	Present, but not very clear	Clear, concise, and understandable; flows from background info.
Research Methods (How was it done?)	Absent or not clear	Vague idea of what occurred	Clear presentation of the approach and specific methods used
(Expected) Results (What did you learn?)	Absent or not clear	Results summarized, but some clarification questions remain and/or figures are absent	Clearly and concisely summarized results presented in figures
Conclusions (What does it mean?)	Absent or not clear	Conclusions or relevance clear, but not both	Clear and relevant conclusions
Grammar (Sentence structure, grammar, spelling)	Poor grammar or unclear	Some grammatical mistakes	Few mistakes, excellent writing style

Peer Review Instructions:
Please evaluate each component according to the rubric guidelines. Offer ***specific*** suggestions for how to improve the components.

Title & Authors 1 2 3
Comments/Suggestions:

Introduction 1 2 3
Comments/Suggestions:

Hypothesis or Research Question 1 2 3
Comments/Suggestions:

Research Methods 1 2 3
Comments/Suggestions:

(Expected) Results 1 2 3
Comments/Suggestions:

Conclusions 1 2 3
Comments/Suggestions:

Grammar
Comments/Suggestions 1 2 3

e. Delta Internship Reflective Statement

Teaching-as-research

The most important lesson I have learned is that to implement a successful teaching-as-research project, logistics are essential. People don't always do what they are told or what they are supposed to do, and the researcher has to be ready to find ways to gain meaningful data from the information that he or she has. Because I was not in charge of the test and control sections, it made it difficult to properly implement my methods. It made me understand the importance of very careful planning and thinking about small details that could make or break a project.

Learning Communities

I was involved in several learning communities during the course of this internship. First was the virtual learning community that was created by the wiki that I developed. Students at first were excited about it, were commenting on each other's projects, and using it quite a bit. The second learning community was that of all of the facilitators of each of the sections of this class. We met once a week, and it was so interesting to hear about the personality differences between sections of students and the diversity of approaches that facilitators used to tackle the same assignment or learning problem. The same content was taught in every section, but yet each section was vastly different. I learned quite a bit by just listening to these conversations. The final learning community that I was a part of was that of the internship seminar. This group, through the questions of the students and the experiences of the facilitators gave me a solid introduction to the world of teaching and teaching-as-research, an introduction that would have been slow in coming had I been left to my own devices. This foundation of teaching knowledge I have gained will be extremely helpful in my future teaching career, as I will understand the issues that arise while performing quality teaching as research.

Learning-through-Diversity

As I reflect on diversity that I have experienced in this internship, I think back again to the differences in the sections and the facilitators that taught them. I learned a great lesson from one of the facilitators who had a student in his class who was fairly outspoken and opinionated on several issues. I felt bad for this facilitator, because I thought that this student would end up being detrimental to the discussion that was to take place in the class, but after describing the conversation that resulted from a comment made by this student, the facilitator remarked, "She's great. I wish I could lend her out to the other sections. She makes the quieter ones so angry that they speak up." I was taken aback by this completely opposite opinion, then realized that he was completely right. This lesson taught me that just because I may find someone controversial and whose opinions differ from my own does not mean that this will hinder group discussion or in fact the nature of the class in any way. In fact, it will enhance it, as demonstrated in the section where the outspoken student initiated discussion from the shyer students. Diversity, then, is imperative for lively discussions and an enriching classroom experience.

f. Artifact: Sample Wiki Page

This selection from the wiki is one conversation that took place between Jen (a student), some facilitators (Jenny and Chris) as well as other students (Ziyi, Natalya, and Dhara). All students posted abstracts of their research projects on the wiki so that other members of the class (students as well as facilitators) could comment on their abstracts and provide constructive feedback. The following conversation is one that is concerning the content of Jen's abstract and was one of the more interesting conversations that took place on the wiki. This was a conversation that also happened in the class, and it continued to be an issue that was heatedly discussed on the wiki. Eventually, Jen did rewrite her abstract to be more understandable for the audience she was writing for. I included this as an artifact because it shows how wikis can be a place to continue classroom conversations and get people involved that may not feel comfortable speaking up in class.

[edit] From Jen:

As far as definitions in my abstract go, I'm going to provide a quote from my PI:

"*When someone says they don't understand how a backcross limits alleles, it doesn't show your lack of ability to convey this information, it shows their lack of understanding of genetics (or yours, or mine!). You can't explain everything, so stating the goal, and what you did, regardless of the technicality of the language used, is the proper objective. Only if you are using very new or obscure techniques would you consider it jargon.*"

Therefore, I'm not going to define gametophytic self-incompatibility in my abstract since the concept has been around since at least 1969. I'm not going to explain the genetics of creating a backcross population, either, since that's been around since Mendel. Jennifer K 15:56, 18 February 2008 (CST)

Natalya's abstract comments

Overall, this looks very well done and interesting. The only thing that I would suggest is in the first sentence you say "selected traits" and that's a very broad statement. I would say "selected traits, such as..." to narrow down what you are talking about. Also, the last sentence you say, "If our hypothesis is correct..." but you never stated what your hypothesis was. I would definitely include a statement like "I/We hypothesize that...". I also don't think that you even prove a hypothesis, you only support it. Other than that it looks great!

> I understand that "selected traits" is a very broad statement, but the purpose of this experiment is to create a protocol that any plant breeder can use, no matter what traits he wants to breed into his plants. Therefore it is deliberately left broad. I did make the hypothesis a bit more obvious, though. Jennifer K 19:07, 17 February 2008 (CST)

[edit] Dhara's Feedback:

Jennifer, your abstract is very well done. It is interesting and the methods are clearly explained. However, I am a little confused on your hypothesis. I think that it would be a good idea if you clearly state it.

[edit] Jenny's Feedback

I think if you added some brief definitions of some of the lingo that you are using in parentheses, that would be very helpful. Phrases such as "gametophytic self-incompatibility" is the major one. Also, what is your hypothesis, specifically? Jarens 17:46, 17 February 2008 (CST)

[edit] Chris W.'s comments

Hi Jen,

I too have to admit my ignorance, since it is not entirely clear to me what 'hybridity' means. I want to echo Chris D.'s comment about knowing your audience. If you go to a plant genetics meeting, everyone should be familiar with the terms you use - but this is an audience of intelligent but 'naive' scientists who would like to understand your science. You may need to simplify things to reach them. Once they stand in front of your poster and you get the sense that they are interested in learning more, bring it on!

[edit] Ziyi's question

sorry but what is an s-allele? what trait is it for?

Ziyi W 16:41, 19 February 2008 (CST)

III. Teaching in the Research Lab

a. Creating a Learning Community

"Where is the MUC16?" an excited undergraduate student asked me as we looked at some ovarian cancer cells under a microscope. I was startled. MUC16 is a protein on the surface of a cell. Although it is large as far as proteins go (which I had been emphasizing to this student), a person would need a very high-powered microscope (such as an electron microscope) to visualize it. This fact is simply second nature to me. When this student asked me this question, it was a profound moment for me. The idea that I had been trying to get across (that MUC16 is a large protein) had been understood, but I had provided no frame of reference for the student and thus the idea then became a misconception. It struck me how ideas can be interpreted totally differently than the person conveying them had originally meant for them to be understood. It became clear to me then that effective communication is vitally important in teaching.

It was in the lab where I discovered that I loved teaching, and where I began to build my skills as an effective communicator of science. I have had the pleasure of mentoring 6 undergraduate students with separate projects in my lab. As a new graduate student, this was a wonderful learning experience that challenged what I didn't know and built my confidence in what I did know. I decided to focus more on improving my mentoring skills and as a part of my learning community requirement for the Delta Certificate I participated in Entering Mentoring. It was in this course that I developed my Mentoring Philosophy (see p. 25).

During one semester of my graduate school career, we had four undergraduates working in the lab, and we met once a week to talk about the experiments of the previous week and what they did and did not understand. This "undergraduate meeting" idea was one I decided to implement as a suggestion from Entering Mentoring. As this meeting was just the four undergraduates and myself, this lab meeting was a comfortable place for the four of them to voice what they may be frustrated or confused about. It was very rewarding for me to help the students see the connections between their projects and deepen their understanding of what our lab was all about. In addition, they often saw connections between classes they had taken, and were excited to be a part of a real world application of what they had learned in a textbook. Unhealthy competitive attitudes were dissipated. Students discovered that they were not the only ones who didn't understand a certain concept, and on the other hand were sometimes surprised to find out other students knew something that they did not. In the lab, they began talking with each other about their projects and working together. It was wonderful to see them opening up, letting down their guard, and talking science with each other. In this way, we formed a diverse learning community. Their diverse backgrounds academically (different courses taken) as well as culturally (Phillipino, Indian, and American) were all utilized and they began to understand each other, rather than want to compete or outdo one another. This experience very much reaffirmed to me the power of bringing people of diverse backgrounds together on an even playing field in a comfortable environment that encourages discussion and learning. This is a very powerful tool, and when done correctly and with the right attitudes, can be a big help to ease tension and competitiveness. I will be using this technique as I mentor future undergraduate students.

My definition of a learning community encompasses many of the qualities that I described in the group above. All participants are equal contributors of the community, and use what the know together to

make each individual person increase their own knowledge. Everyone feels comfortable sharing their knowledge, and no one judges others on what they don't know. The diversity of the group enhances their ability to learn, as each brings different experiences to the group.

b. Mentoring Philosophy

Mentoring an undergraduate student in a lab is a responsibility that is not to be taken lightly. In order for research to continue, mentors need to encourage those who are interested in research to pursue their goals, and be supportive and helpful along the way. Careful attention must be made to cater mentoring strategies to the individual. Responsibilities of both parties must be clearly laid out and understood, and constant feedback between both parties is essential. These three elements can help ensure that both parties learn as much from each other as possible and provide the mentee with a lasting, positive experience of scientific research.

As a mentor, my primary objective is to foster an environment of open dialogue and the free-flowing exchange of ideas. In order to foster this environment, I must understand the mentee as an individual, and cater my mentoring towards his or her personality and personal goals. For example, some students feel unsure of themselves in a laboratory environment, and need constant reassurance and oversight. Others feel comfortable enough to make their own decisions, and can feel smothered with too much interference from the mentor. These issues, as well as other personality differences, must be taken into consideration when strategizing the best way to mentor a particular student.

There are responsibilities to be had for both parties. These responsibilities should be clearly laid out before the mentee begins work in the lab. As a mentor, I am responsible, to the best of my ability, to provide an environment that is free of racism, sexism, or any other attitude that may hinder my mentee's learning ability. I first will listen to the goals and expectations of the mentee, and then attempt to provide him or her meaningful opportunities to help them make the best of their experience with me. The mentee is responsible for adhering to our agreed upon time schedule, putting for the their very best effort in order to learn what I aim to teach them, conducting themselves in an ethical manner, and coming to me with any questions, concerns, or problems they may have. This environment leads the way to a strong foundation of science knowledge that can be applied to many problems and projects.

Feedback is extremely important in order to ensure that each party is adhering to their previously described responsibilities. Progress evaluations mid-way through the semester are one way to keep dialogue open between mentee and mentor. Feedback is also constant during the learning process. As the mentee begins in the lab, much time is spent learning background information, grasping the "how" and "why," and establishing themselves in the lab. The mentor encourages the mentee to express frustrations, likes, and dislikes, and then offers suggestions and feedback. As the mentee becomes more comfortable with techniques, she becomes more independent, confident, and self critiquing. When the mentee progresses to this new level of understanding, he and the mentor can engage in challenging each other to rethink old ideas and ask more complicated questions.

Creating the proper learning environment for the mentee, both parties carrying out their specific responsibilities, and constant dialogue and feedback are important ways that the mentor/mentee experience can be successful for both parties. A positive experience in a lab is an essential part of encouraging undergraduates to consider careers in research, and this is attainable by keeping in mind these essential elements.

IV. Teaching in the Community

a. Learning-through-Diversity Reflection

Learning-through-diversity is a way to use everyone's experiences and backgrounds to make the group (or learning community) as a whole better and more knowledgeable. People, thankfully, are not identical, and everyone's knowledge and experiences are different. This means that not only can everyone contribute to a learning community, but everyone may learn differently within that learning community. It is then the facilitator or teacher's responsibility to use several different types of teaching strategies to teach major concepts, and to create an environment that is inclusive to everyone. This can be accomplished by learning everyone's name, emphasizing willingness to help students, and treating all students as equals no matter of their race, gender, sexual orientation, or socioeconomic status.

My definition of learning-through-diversity can be applied to my commitment to helping to educate the general public about science. Communicating to future or fellow scientists can be a challenge, but it is even more challenging to speak about science to the general public. However, this is essential in our world today. With science, ethics, and politics so intricately entwined, everyone needs a basic knowledge of science. The problem is that many people are intimidated by scientists and science, and feel that it is something beyond their comprehension. I hope to dispel this notion by becoming a voice for science within my community.

Teaching within the community is where I see learning-through-diversity come to life. I firmly believe that knowledge is power and every piece of knowledge we have contributes to the decisions we make. For an example in my field, a woman may find out that she has a genetic predisposition to breast or ovarian cancer, and may decide to undergo prophylactic surgeries to decrease her risk of cancer. Or, if a pregnant woman knows that smoking may be harmful to her fetus, she may make the decision not to smoke during pregnancy, saving that child from a lifetime of possible health issues. Learning about what medicine can do as well as what it can't do can also influence family health decisions. Making knowledge accessible and encouraging everyone to learn and ask questions makes us a better society. In addition, increasing the diversity of the people in science makes science more accessible to everyone else. When a child sees someone they can relate to in a position that they admire and respect, they gain confidence in their own abilities to achieve their goals. It is only if everyone, regardless of sex, race, socioeconomic class, or cultural background, contributes to the body of knowledge that we can be the best we can as a society. In order to achieve that lofty goal, I want to inspire the thirst for knowledge in the younger generation, and make them want to know information that will improve their quality of life, and gain the confidence to ask questions of experts. Even more so, I want to inspire them to contribute in some way to the knowledge that we already have, and to make their mark on the world.

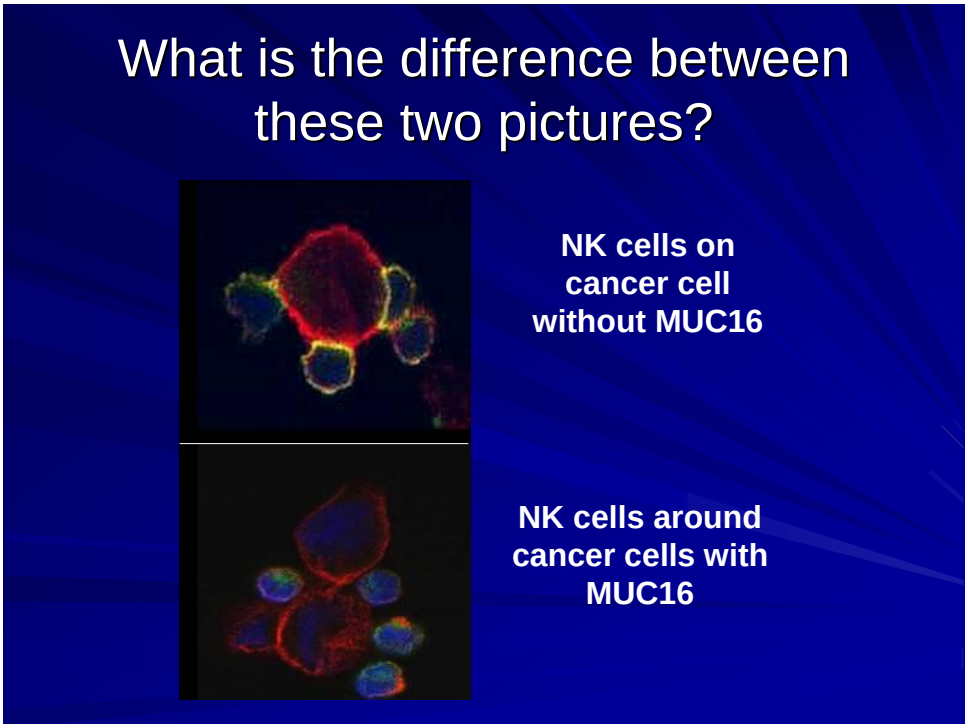
Expanding Your Horizons is one venue at UW-Madison in which I hoped to inspire and promote science among the younger generation. This conference is for 6-8th grade girls and aims to encourage them to seek out different science careers and get excited about science. The girls were a racially diverse group that came to Madison from all over Wisconsin on a Saturday and visit three different labs during that day. It was great to see them interested and engaged in what we were doing in the lab, and satisfying for us to be able to explain to them in a simple way what our research was about.

Another community activity that I have been exposed to is Fusion Science Theater. This group, led by Dr. Holly Kerby, produces the show "Science in a Box," a production that teaches kids about chemistry through a skit which encourages audience participation. This production is carefully designed to teach kids one major scientific concept as well as the scientific process. It makes science fun and understandable for kids, so they come away with knowing an important concept (how water boils, for example) as well as how one would go about solving a scientific question. I hope to begin my own production of "Science in a Box," with the help of undergraduates in my career as a professor of biology at Augustana College.

I have represented these two different ways of how I engage in teaching in the community by showing some of the slides that I used for the Expanding Your Horizons conference as well as attaching the brochure for Fusion Science Theater. Participating in these activities helps me to understand the importance of learning-through-diversity by encouraging younger generations to get excited about science. I want to encourage all of them that they have something to offer, regardless of their race, gender, or socioeconomic status.

b. Expanding Your Horizons Artifact

The following are a few slides that were presented at the Expanding Your Horizons Conference used to explain my research. My research focuses on ovarian cancer, and a very large protein (MUC16) that is overexpressed by these cells. It was my goal to get them to understand how ovarian cancer cells use this protein as a steric barrier to protect themselves from the immune system. In this way, they could have a better understanding of how ovarian cancer grows and spreads within the body. By using confocal images of real cancer cells and real immune cells (NK cells), I wanted to give them a visual context of how to think about cells interacting with each other. I explained to them the concept of immune synapses, and how NK cells must get very close to their target cells in order to kill them. After explaining about ovarian cancer, MUC16, and immune synapses, I presented them with the following slides with the pictures only to see if they had understood the project that we were discussing (the cancer cells are the larger cells in each picture, and the NK cells are smaller):



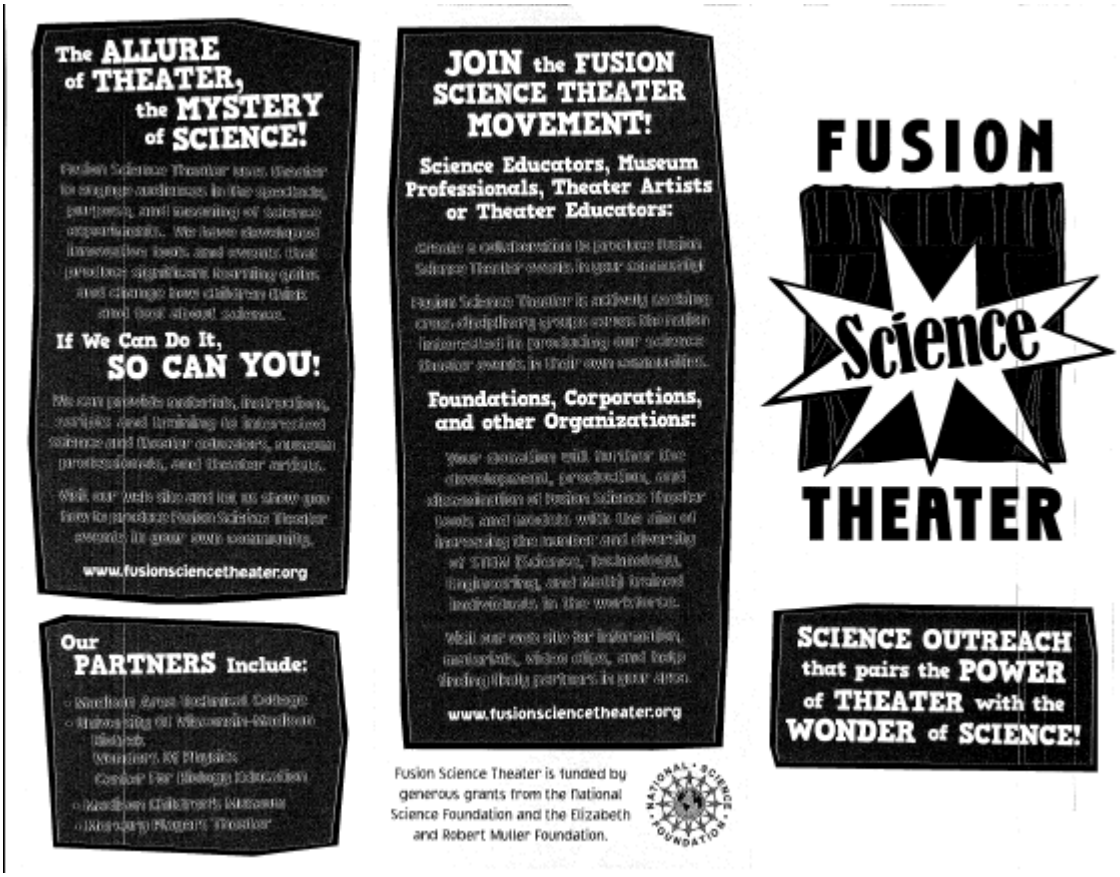
After showing the pictures, they correctly identified the cancer cells with and without MUC16 which reaffirmed to me that they understood my explanation. From there, we went to the lab and they learned how to make these types of pictures:

How do we get these pictures?

- Step 1: Put the two cell types together
- Step 2: Make the cells stick onto glass coverslips and make them glow
- Step 3: Look at them under the microscope

c. Artifact: Fusion Science Theater Brochure

This final section of my portfolio is the Fusion Science Theater Brochure that is representative of an endeavor that I have not yet begun, but am very much looking forward to pursuing at Augustana College.



YOU can produce FUSION SCIENCE THEATER shows IN YOUR OWN COMMUNITY!

RIGHT-BRAIN TOOLS for LEFT-BRAIN LEARNING

- Act-It-Outs invite audience members to the stage to play the part of atoms or molecules in science models.
- Host Characters connect with the audience, provide comic relief, and help with the presentation.
- Theatrical themes heighten and focus audience attention, expectations, and involvement.
- Dramatic questions set-up and drive teaching and learning.
- Cross-disciplinary collaborations of outreach professionals, science educators, and theater artists produce Fusion Science Theater events.

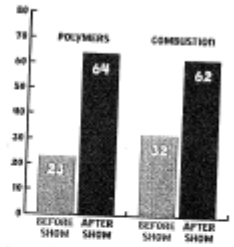
Fusion Science Theater tools can also be used to make hands-on activities more engaging and educational. Visit our web site to find out how!

www.fusionsciencetheater.org

The AMAZING CHEMICAL CIRCUS

The Amazing Chemical Circus is a full length theater show featuring three sets of demonstrations as the acts of a circus.

Each set is performed by a science educator and investigates a scientific question. Host characters of Ringmaster and assistant "Squirt" introduce the question, interact with the audience, interject humor, and coordinate "Act-It-Out" segments that bring children to the stage to portray electrons, atoms, and molecules.

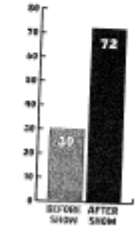


Percentage of kids (N=46) correctly answering concept questions about polymers and combustion.

SCIENCE In A BOX

Science in a Box is a short, traveling show featuring "Act-It-Out" segments, science demonstrations, and a mysterious box.

For example, "The Boiling Point" explores the question "What happens to water when it boils?" using a model of scientific inquiry. Kids join the fun by voting for their favorite hypothesis and performing the "Dance of the Water Molecule."



Percentage of kids (N=123) correctly answering the question "What happens to water when it boils?"

V. Summary

Teaching in my life encompasses three forms: teaching in the lab, teaching in the classroom, and teaching in the community. This document is evidence of what I have accomplished thus far in each of these aspects, but, more importantly, it is a proclamation of what I aspire to become. I look forward to mentoring undergraduate students in the lab doing research, I hope to refine my skills as an effective communicator and educator in the classroom, and I will be engaged in educating the public about science through Fusion Science Theater and other venues. The three Delta pillars will be a key part of my growth as an educator. I will use teaching-as-research to gather data on how my students are performing and how to increase their learning to the best of my ability. Learning communities will be formed in my classroom as well as in my research lab, where the free-flowing exchange of ideas will be possible. This exchange of ideas will be facilitated by diversity, which will increase the depth and breadth of the conversation and bring new ideas to the table. It is my duty to create a comfortable and equitable learning environment for my students, so that nothing will hinder their learning. I look forward to implementing these pillars into the teaching that I will do in the lab, classroom, and community.

Who dares to teach must never cease to learn. ~John Cotton Dana

Acknowledgements

I am indebted to many people who have helped make this teaching and learning portfolio possible. I am deeply grateful to my internship, teaching and job-hunting mentor, Janet Branchaw. Thanks also to the following people: Holly Kerby for encouraging my interest in Fusion Science Theater and agreeing to help me with it in the future; Manish Patankar, my PI, for exemplifying excellent mentoring skills and for letting me pursue my teaching interests; Don Gillian-Daniel for critical reading of this portfolio and sharing his wisdom about effective teaching; Tessa Lowinske Desmond for the critical reading of this manuscript and help with preparing for the certificate defense; Bob Mathieu for critical reading of this portfolio and sharing teaching wisdom during internship seminar; Chris Pfund, who took the time to meet with me about Delta in the very beginning; Chris Day, Kevin Elicieri, and Nick Balster, my fellow facilitators for Entering Research; the Entering Research students for dealing with the technicalities of the wiki; Helen Holden, Sachi Horibata, Tanjina Shabu, and Dhara Patel—the undergraduates who helped me to understand the value of learning communities; and finally, to the Delta Community for continuous support.

Appendix 1: CV

Jennifer A. Arens Gubbels

University of Wisconsin-Madison
Endocrinology-Reproductive Physiology Program
600 Highland Ave., H4/656 CSC
Madison, WI 53594
402-360-0393
arens@wisc.edu

Education

2004-present: University of Wisconsin-Madison Endocrinology-Reproductive Physiology PhD Program. Advanced to candidacy April 21, 2007. Completion of PhD expected in May, 2009.

2000-2004: Loras College, Dubuque, IA. B.Sc. Biological Research and Honors *cum laude*. Minor: English Literature

Teaching Experience

Fall 2008: Teaching Assistant for an upper-level physiology course for pre-nursing, physical therapy, and 1st year pharmacy students.
Anticipated completion of the Delta Teaching and Learning Certificate (please see enclosed flier).

Summer 2008: Delta course: The College Classroom: Liberal Arts, UW System, and Tech Colleges. This course involved visits to several different institutions of higher learning to explore the experiences of the faculty who work there. In addition, we read teaching literature about assessment, diversity in the classroom, and active learning. Using this information, we developed a peer-reviewed lesson plan.

Spring 2008: Delta Internship: Co-facilitator for the course "Entering Research" for undergraduates working in research labs. I was directly involved in the modification of the syllabus of this new course. I also developed and maintained a wiki for one section of the class.

Fall 2007: Delta course: Effective Teaching with Technology. This course involved learning about different technological teaching tools including clickers, podcasting, and online courses software (Moodle).

Fall 2006: Delta Learning Community: "Entering Mentoring" This group of graduate students met once a week to discuss effective mentoring strategies to create the best experience possible for ourselves and the undergraduates in our labs.

2004-2008: Mentored 6 undergraduate students with research projects in our lab.

2002-2003: Heitkamp Planetarium Presenter, Loras College. Wrote and presented interactive shows about constellations and the solar system to schoolchildren and members of the community.

2001-2004: Writing Lab tutor, Loras College. Assisted students in improving their writing skills through one-on-one tutoring sessions.

Positions and Employment

2004-present: Research Assistant, University of Wisconsin-Madison under the direction of Dr. Manish Patankar. Thesis title: "The Role of MUC16 in the Immune Evasion and Metastasis of Epithelial Ovarian Cancer."

2003: Dean Foundation Madison, WI. Responsible for the processing of laboratory specimens from study patients. Learned phlebotomy skills.

2003: Research Assistant, Loras College, under the direction of Dr. Tom Davis. Found and collected data from painted turtle eggs including weight, nest temperature, and nest moisture content to determine the effect of moisture and temperature on egg and hatchling weight.

Awards and Honors

2008: Vilas Travel Grant Award-University of Wisconsin
2006-2008: National Institute of Health T23 Training Grant- Endocrinology-Reproductive Physiology Program
2004: Vorwald Scholarship for Science-Loras College
2004: Monsignor Schulte Scholarship-Loras College
2000: St. Joseph's Award-Loras College

Memberships in Professional Societies

2005-present: American Association for the Advancement of Science
2006-present: American Association for Cancer Research

Posters and Presentations

"MUC16 Aids Ovarian Tumor Cells in Immune Evasion and Metastasis." Invited Talk. North Central College, Naperville, IL. October 20th, 2008.

Gubbels JAA, Horibata S, Felder M, Holden H, Patankar MS, Sondel P, and Connor J. "Immunocytokine KS-IL2 increases natural killer (NK) cell synapse formation and conjugates effector and target cells via the IL-2 receptor." Poster presentation. International Society for the Biological Therapy of Cancer. San Diego, CA. Oct 31st-Nov 2nd, 2008.

Gubbels JAA, Felder M, Holden H, Connor J, Patankar MS. "Cell-surface bound MUC16 (CA125) shields ovarian tumor cells from natural killer cell mediated attack." Poster presentation. International Society for the Biological Therapy of Cancer. San Diego, CA Oct 31st-Nov 2nd, 2008.

Gubbels JAA, Felder M, Holden H, Patankar MS, Sondel P, and Connor J. "KS-IL2 therapy can overcome inhibitory effects of cell surface MUC16 in epithelial ovarian cancer." Invited Talk. Western Association for Gynecologic Oncologists (WAGO). Sacramento, CA. June 14-17, 2008.

"MUC16: A Cloak and Dagger Approach to Evading the Immune System in Epithelial Ovarian Cancer" Invited Talk. Loras College, Dubuque, IA, February 2008.

Gubbels JAA, Belisle JA, Felder M, Petrie S, Connor J, Patankar MS. " Ovarian tumor mucin MUC16 protects the cancer cells from NK cell attack" Keystone Symposia on NK and NKT Cell Biology, Keystone, Colorado, Feb 24-29, 2008.

Belisle JA, **Gubbels JAA**, Raphael C, Pastan I, Andre S, Hans-Joachim G, Migneault M, Rancourt C, Connor JP, Patankar MS. "MUC16 promotes peritoneal metastasis of ovarian tumors and inhibits natural killer cell function: implications in pregnancy and gynecologic pathologies." Mucins in Health and Disease. Cambridge, UK. July 2007.

Belisle JA, **Gubbels JAA**, Raphael C, Migneault M, Rancourt C, Connor JP, Patankar MS. "Natural killer cells from epithelial ovarian cancer patients exhibit an altered phenotype and bind to MUC16." American Association for Cancer Research. Los Angeles, CA, April 14-18, 2007.

Arens JA, Belisle JA, Onda M, Connor J, Rancourt C, Ho M, Bera T, Pastan I, Patankar MS. "Mesothelin binds to the oligosaccharides expressed on MUC16 to promote peritoneal metastasis of ovarian tumors. Society for Gynecologic Oncology. March 2006.

Arens JA, Belisle JA, Onda M, Rancourt C, Ho M, Bera T, Connor J, Pastan I, Patankar MS. "Investigating the binding between mesothelin and MUC16 (CA125), two markers that are elevated in patients with epithelial ovarian cancer." Ovarian Cancer: Prevention & Detection of the Disease & its Recurrence: Molecular Targets & the Immune System. Pittsburgh, PA October 24-25, 2005.

Belisle JA, **Arens JA,** Migneault M, Rancourt C, Felder M, Connor J, and Patankar MS. "The role of the ovarian tumor marker MUC16 in the suppression of the human immune response." International Society for the Biological Therapy of Cancer. Arlington, VA, November 10-13, 2005.

Publications

Gubbels JAA, Connor JP, and Patankar MS. "The Role of MUC16 in the Pathogenesis of Epithelial Ovarian Cancer." Book Chapter. Methods of Cancer Diagnosis: Therapy and Prognosis. Springer Co. 2007 in press.

Belisle JA, **Gubbels JAA**, Raphael C, Migneault M, Rancourt C, Connor JP, Patankar MS. "Peritoneal natural killer cells from epithelial ovarian cancer patients show an altered phenotype and bind to the tumor marker MUC16 (CA125)" *Immunology*. 2007 Nov; 122 (3): 418-29.

Gubbels JAA, Belisle JA, Onda M, Rancourt C, Migneault M, Ho M, Bera T, Connor J, Sathyanarayana BK, Lee BK, Pastan I, Patankar MS. "Mesothelin binds with high affinity to N-linked glycans expressed on the ovarian tumor mucin, MUC16" *Mol Cancer.* 2006 Oct. 26; 5(1): 50.

Engle DB, Belisle JA, **Gubbels JAA**, Petrie SE, Hutson PR, Kushner DM, Patankar MS. "Effect of Acetyl-L-Carnitine on Ovarian Cancer Cells' Proliferation, Nerve Growth Factor Receptor (Trk-A and p75) Expression, and the Cytotoxic Potential of Paclitaxel and Carboplatin" *Gynecologic Oncology.* 2009 in press.

Gubbels JAA, Felder M, Holden H, Belisle J, Migneault M, Rancourt C, Connor J, and Patankar MS. "MUC16 sterically inhibits synapse formation with natural killer cells in ovarian cancer cell lines." *Journal of Immunology.* 2008. Paper under review.

Belisle JA, **Gubbels JAA**, Connor J, and Patankar MS. "MUC16 binds to an inhibitory receptor on a subset of natural killer cells in ovarian cancer patients." Paper in preparation.

Service

2008-2009: Endocrinology-Reproductive Physiology Recruitment Focus Group

2008: Expanding Your Horizons Conference Presenter: A conference for 6-8th grade girls interested in science.

2006: Chair of Endocrinology-Reproductive Physiology Symposium Committee

2004-2005: Served on Endocrinology-Reproductive Physiology Symposium Committee

2004: Undergraduate Honors Service Learning Project: founded after-school science program at an underprivileged elementary school in Dubuque, IA.

References

Dr. Manish Patankar (PhD advisor)
University of Wisconsin-Madison
Assistant Professor
OB/GYN
Box 6188 CSC H4/655
Madison, WI 53792
(608) 262-8871
patankar@wisc.edu

Dr. Janet Branchaw (Delta internship mentor)
University of Wisconsin-Madison
Center for Biology Education

103b Henry Mall 445
Madison, WI 53706
(608) 262-1182
branchaw@wisc.edu

Dr. Tom Davis (Undergraduate advisor)
Loras College
Professor of Biology
Science Hall Rm. 133A
LC Mail Box #19
Dubuque, IA 52004
(563) 588-7767
tom.davis@loras.edu