Compendium for Using Metacognition in the Classroom

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I. Introduction: Why Do We Need to Create a Compendium?

Project Origins

Some of the ideas contained in this compendium came about during a workshop in January 2013 about Learning and Metacognition. During the workshop, several faculty members began to discuss concerns about students. Two particular issues emerged as important starting points for this project. The first issue highlighted a continuing, and potentially worsening, problem where students would disengage from the learning process. We shared several similar stories about when students would stop turning in assignments or even coming to class after experiencing an academic set-back, such as a poor grade in a test or not understanding a reading. This would often spiral to the point where a student would fail or drop the class. We lamented at the lack of resiliency among many of the students.

The second groups of stories focused on the high-achievers in the classroom. These stories recalled students who obsessed about grades and outcomes rather than the process of learning. In particular, faculty pointed out how these students tried to figure out the "right" answer or tended to repeat the language and memorized facts. While we enjoyed teaching these students, faculty wondered if, at some level, something was missing from their academic experience. Moreover, we noticed that these students tended not to take any risks – in papers, class discussions, or on tests. We worried about the intellectual and academic growth in these students – whether they would emerge transformed by the college experience in their abilities to think and reason or would they have just memorized content for a test and then forgotten it?

From these dual concerns, we applied and received a grant from the SEPCHE/Teagle initiative on Building Faculty Capacity in the 21st Century. In the spring 2013, a group of faculty in various disciplines constructed and implemented teaching strategies for building resiliency

and risk-taking in students. By taking a metacognitive approach, we wanted to improve our teaching in the classroom to help students in the learning process. In particular, the faculty cohort focused on "productive failure" in the hopes of teaching both resiliency and risk-taking to all levels of students – where struggling and excelling students learned skills and experiences of how to handle and embrace failure.

The Original Experiment: An Exercise in Productive Failure?

The results were mixed. Each faculty participant kept a reflection journal about teaching productive failure. After analyzing this data, we found there was a significant amount of discussion and engagement in the classroom by the students, while at the same time faculty felt students disengaged and quit at several times. Faculty and students expressed frustration and confusion at times, while unsure of the exercises and the results. One significant tension emerged around students completing the assignments and exercises. Most of the journal entries noted the discussions that followed the exercises. These discussions, even when focusing on how frustrating the exercise was, engaged the students and even reached students who did not even complete the assignment. This hidden positive impact highlighted the nature of discussion as student engagement. This questioned the role of the assignments - is it about students doing the work or about students learning? While there is a critical link between the two, the reflective journal entries suggest that student engagement and learning can still happen if the work is not completed. It is interesting to note that the tensions did not seem to erupt between the faculty and students. In fact, faculty often blamed themselves for problems, stating they should be more specific about the exercises, rather than having a negative perception of the students. Finally, the

faculty journal entries highlighted an increase in student awareness about risk-taking and resiliency, even if students did not like it or want to do it.

Most important, a number of faculty members found at least one if not more exercises that produced excellent outcomes. For example, one faculty participant asked students to write a song in style of the Free Speech Movement that addresses an issue at Rosemont College and then submit an explanation of how the song reflects the strategies of the Feminist Social Movement. Another faculty participant asked students to write a 2-3 page double-spaced essay analyzing their failures, why they occurred, and what they have learned from them. As one student wrote, "I should be more open to the idea of failing, I should really celebrate in failing, because it actually does bring me one step closer to knowing...I don't want to graduate in 2 years [sic] time with the same attitude and perspective that I came in with...I want to spend my time here molding myself into a leader, a thinker, and an innovator. I can only do that, though, when I let my guard down and start failing." This example is only one of many interesting and important reflections by the students.

Current Work: An Opportunity for Resiliency, Reflection, and Implementation

This project began from this initial premise: if using metacognition based teaching strategies appear to have important outcomes, yet are problematic to implement in the classroom, what can faculty do to reduce any issues? This compendium serves several purposes: a) to continue the conversation among faculty about using metacognitive based teaching strategies in a supportive learning community; b) to provide a guide for faculty who would like to use teaching strategies based on metacognition but do not have the time or the resources to research, learn or

develop these strategies; and c) to produce transferrable and shared knowledge about metacognitive teaching strategies to other faculty and administrators.

In the chapters below, faculty recount their experiences using metacognition in the classroom. The chapters are not meant to serve as templates, but to continue the conversation about using metacognitive based teaching strategies in the classroom. However, we hope to provide some concrete examples of how we used metacognition to encourage other faculty to employ some of these exercises. Moreover, by providing this compendium, we expect other faculty to adapt and revise these exercises, and create some new ones (and hopefully share them with us!).

To further encourage a productive learning community, the chapters below also share not only our successes but also our failures in the classroom. We attempt to identify major roadblocks in using metacognitive based teaching in the classroom, and explain what we did to address these problems. Finally, each chapter takes a prospective view on how to incorporate metacognition the classroom, looking at future opportunities and challenges for ourselves and any instructors who might want to incorporate metacognitive teaching strategies.

II. Metacognition and the Marine Biology Lab

John Ullrich and Jeanette Dumas

Marine Biology Laboratory Background

During the 2012 academic year we converted a small non-useable room into a marine biology laboratory. The concept of the program was that designing, building and maintaining a captive, living, coral reef ecosystem with a team of students will serve as an excellent metacognitive teaching tool. This was not a virtual laboratory, but a real living system that enables the students to "dive right in". This hands-on living laboratory allowed each student's work to become an integral part of an ecosystem for a very long time.

The captivating beauty of a coral reef ecosystem engaged students immediately and breathed enthusiasm into hard to grasp concepts from their science courses and any related core General Education Courses, ex. Environmental Issues, Environmental Sciences, Life Sciences and Science for Life. When a student is faced with the challenge of actively participating in the design, building and maintenance of a living biological system, they develop an ownership for the system and for learning about it.

Introduction and Objectives

The Marine Biology Laboratory project provided faculty and students the opportunity to engage in scientific investigation outside of the traditional laboratory setting. Our primary goal was to engage students, from multiple majors, in an inquiry based scientific investigation of complex scientific concepts along with the process of scientific inquiry using the living coral reef ecosystem as the vehicle for learning.

Freed from the constraints of cookbook lab exercises, students:

- Engaged in problem solving requiring higher order thinking skills
- Experienced first-hand the thrill of discovery
- Learned how to work collaboratively on a team
- Took ownership of their learning by applying classroom knowledge and concepts from their course load to the reefs design and maintenance

Since the project inception there were no "instructions." The freedom to "think on your own" was our primary metacognitive tool. To mold the students' self-awareness as learners, we also incorporated the use of Learning Logs and Critical Incidence Questionairres (described below).[1]

Prepare Learning Logs

Students kept a journal for weekly entries. They wrote about how they connected new information they learned that week from the reef project with what they already knew as well as how their work with the coral reef related to concepts they learned in their classes. This helped students construct a scaffold of scientific knowledge, each week assimilating new knowledge with old.

Weekly Critical Incident Questionnaire (CIQ)

Every week we asked the students to answer the same set of questions about their learning experience, for that week, with the coral reef project:

a. What surprised you the most about any aspect of the reef project?
b. What decisions were made that were based upon hypothesis testing?
c. Did any discoveries have elements of luck or serendipity?
d. What background knowledge did you use to make a new decision?

[1] Elizabeth F Barkley, *Student Engagement Techniques: A Handbook for College Faculty* (San Francisco: Jossey-Bass, 2010).

e. How did you work collaboratively with another student or faculty member to solve a problem?

We also used team-based learning combined with peer instruction to enhance socially mediated metacognition.[2]

Student Learning Outcomes

The Learning Logs did not work as well as the CIQs, except for really motivated students who enjoyed the process of writing itself. For the average student, the journal was more of a chore. In hindsight, we feel that learning logs could be used successfully but should be reserved for students familiar with record keeping, i.e. science majors.

The CIQ worked fantastically. The questions were broad in scope, but all were reflective in nature. The fact that they were weekly was also important. It gave students a chance to think about what and how they learned that week, helping them to build a foundation. We added an open end question, which could be a statement or in a discussion format. The CIQ was our most successful metacognitive tool, at least for the individual.

The team based learning, combined with peer instruction was also an excellent tool for socially mediated metacognition. Team members had to reflect not only their own interpretations of data or information but also that of their peers. We initially expected the science students to be the leaders in the peer instruction, but that turned out not to be the case. We found that all the students had something to add to the team deliberations at hand. This enabled us to become facilitators, and the students to take on leadership roles.

[2] Hurme, TR., S. Järvelä, K. Merenluoto, P. Salonen. "How Learners Share and Construct Metacognition in Social Interaction?" in Proceedings of the 8th International Conference for the Learning Sciences, ICLS '08 (Utrecht, The Netherlands: ICLS, 2008), Volume 3.

Future efforts will incorporate social media to enhance metacognition. Social media is a big part of student life. For example, a blog instead of the learning log could facilitate the sharing of student observations and reflections. Each week a different student would be assigned as blog monitor, making sure that entries are appropriate and summing up the week's entries. We could provide an outline, similar in scope to the CIQ, to enhance the reflective nature of the blog summary.

Student Evaluation

All students were assessed at the start of the program and then at the conclusion. I was amazed at the increase in their knowledge of marine systems in only a six week period with a total of 32 contact hours. The evaluation focused on:

- Marine Biology
- Basic Water Chemistry
- Engineering (Fluid Dynamics)
- Instrumentation

Initial Evaluation

25 questions, total possible score 100 (100%), and the average score was 30%.

Concluding Evaluation

25 questions, total possible score 100 (100%), and the average score was 80%, with a range from 72-95%.[3]

[3] One outlier scored 40% - the student had a time conflict and was unable to fully participate in the program.

The living laboratory model lends itself to a rapid increase in the students' knowledge as well as an enhancement in the efficiency in which they learn new material via:

- Student-student interaction
- Team Learning
- Problem Solving

An interesting extension of this model is the students' self-awareness with respect to their hidden strengths. The model was designed to address Marine Biology, chemistry, engineering (fluid dynamics), Marine zoology care and husbandry, and instrumentation.

Since the program went active six students have discovered hidden talents and interests. For example, a biology major was truly captivated with the animals in the coral reef and their interaction with other inhabitants within the captive biosystem. This student was also intrigued with the engineering and instrumentation involved with maintaining the water chemistry. This stimulated their design and implementation of an improved method for treating the systems water using a flow through design.

Another student, an English major, has developed an intense interest in coral propagation linked to coral reef conservation. A biology major, focused on animal care, has now become instrumental in coral nutrition with maintaining the culture laboratory to properly feed the corals.

I would like to utilize this learning model for undecided majors to use as a tool to assist with directing their education and career pathway.

Current Courses

An ongoing part of the living laboratory is integration with current courses. During the fall semester, the laboratory was utilized in the Environmental Issues class. We were discussing the world wide decline of coral reefs as a function of coastal waters being polluted by industry

and runoff water. This pollution leads to an increase in nutrients which then initiates a cascade of events leading to eutrophication.

Teaching non-science majors water chemistry and how phosphates and nitrogen containing materials are the food source of algae is tricky and confusing. So, as a class we decided to build a small test model reef in a 10 gallon tank. We used as a control the main reef system. Animals were selected and placed in both systems. We then slowly adjusted the water chemistry until it was similar to a polluted reef and minimized filtration and any external water purification. The water was tested weekly and the animal's condition evaluated over an eight week time frame. By the end of the study the corals in the test reef were so covered with algae that they were unable to undergo photosynthesis. The corals would have perished if left under these conditions for an extended period of time (~four more weeks). We terminated the study, introduced filtration and adjusted the water chemistry to the correct levels and the animals recovered and are now part of the main coral reef. It is important to point out that CIQs were not used for this experiment since the instructor was with the students during all of the work including monitoring the tank.

This experiment was instrumental in teaching all aspects of coral reef conservation: pollution, eutrophication, water chemistry, algae growth and photosynthesis. The final exams displayed impressive student learning in all of the above items. In addition using the living laboratory was fun. The students looked forward to the weekly checkup of their system. They took complete ownership over the project and were immersed in their little satellite reef.

Future Applications

The Marine Biology Living Laboratory was designed to support biology; chemistry; engineering; communication; environmental science, ethics, politics and conservation. The system was designed for the students as a learning tool and a vehicle to open their eyes to possible areas of interest which they may want to pursue in their educational development. The system has served well as an education tool and a research laboratory.

III. Using Metacognitive Strategies in Public Speaking

Chanda Gilmore

The goal of using metacognitive strategies in my spring 2013 COM 0160: Public Speaking course were: 1) help students understand and analyze their fears of public speaking, 2) help students understand and analyze their fear of academic failing (earning a C or below in the course, and 3) understand that there is no perfect speech or speaker at this level in their public speaking career.

Five activities were used; however, only three are mentioned since the other two were variations of the three noted here. These three activities were met with various levels of success in regards to helping students understand their own fear of speaking and failure.

To track my findings, I kept a reflection journal about the exercises I used and detailed what the exercise was, how it was executed, student reaction and analyzed the success and failure of the activity in teaching students about risk-taking and productive failure.

Course Demographic

The course is a core requirement for Communication and English /Communication majors and an elective requirement for Environmental Science and Ethics and Leadership minors.

The course is offered every spring, three days a week over a 15-week semester. The course provides practical experience in preparing, delivering and evaluating oral presentations. Students are challenged to think critically and speak effectively about a variety of topics. The course focuses on students identifying and understanding their speaking skills and abilities.

The spring 2013 public speaking course had 15 students: two international students, two freshmen, four sophomores, three juniors and four seniors. The course had five Communication

majors and one English and Communication majors, with the rest either undecided or other majors. There were six males and nine females. This is a typical composite for this course.

Activity 1: Impromptu Speech for a "Grade"

Student were told on a Wednesday that they would deliver an impromptu speech for a grade on Friday; however, they were not give the speaking order, the speech topic, time or length or point value. This exercise was the third speech given in class, the first without directions given beforehand.

This exercise had two goals: 1) understanding speech anxiety and examine their fears of being wrong or perceived wrong in their speech delivery skills and 2) understand that as a speaker, you may not know your topic until the day you present so need to be prepared to speak regardless of your situation.

As the first exercise of this type, student reaction ranged from high anxiety of not having a formal assignment guideline to being blasé or unconcerned to a sense of release of not having to follow a specific guideline.

On Friday, I had a 100 percent attendance. For the speech, I called students up at random to select a topic from a bowl to deliver their speech on. They had one minute to think of what to say and had to speak for two minutes without help or interruptions. They were not allowed to use any props or write anything down in order to make eye contact with the audience.

The majority of students who were nervous had an increase physical reaction during their speech including increased stammering and fidgeting, greatly influencing their speech. Students who took the assignment in stride were less focused on the speech in regards to their words (more profanity and nonsense words), order and flow.

After student speeches, we discussed how students felt leading up to the task, during the task and how they felt afterwards. I informed students that they received full credit by simply delivering the speech, which once again brought mixed reactions. For those who wanted a "perfect" speech and were more grade conscious, they expressed more relief. Some students felt tricked by the assignment. When these students were further probed they admitted they would not have been so concerned about their lack of preparation and study.

I plan to do this exercise again in the same manner though student reaction was mixed. Students who were more focused on getting an A and having a perfect speech, I feel, gained more from this exercise about understanding one's own anxiety and how that can affect your speech as well as beginning to understand the idea of there is no perfect speech or no perfect way to give a speech.

Students who took this in stride had an opposite effect in that they do not need to practice or research before a speech in order to give a "perfect" speech and get an A. This assumption did affect their future speeches.

Activity 2: Competition Structure Speeches

I created three groups of five students and each group was given the same nonsense poem to recite. The class would determine which person in that group recited it best and that student would receive extra credit. Each group had two males, three females and was a mixture of class year and major. I pre-selected groups based on these facts.

The goal of this exercise was to have students focus on their speech delivery (rate, pace, tone, eye contact, physical appearance and mannerisms) and not on the content (words) of the speech. The secondary goal was to have students understand how delivery and not content

affects a speech and audience and that a speech can be successful or unsuccessful based on the delivery style.

The activity did not have the results as I hoped since I did not take into account competitiveness of people. Students who are naturally competitive were more comfortable and took more risks in delivery (one student dressed the part and another dyed their hair) while others who are not competitive, took less or no risk in their delivery and standing out. They focused more on memorizing the speech verbatim and not on the delivery of the speech.

I may try this exercise in the future but perhaps remove the extra credit element and state that everyone will be graded individually or some type of class scoring. I think the competitive element in understanding failure is a good idea, but two questions arise in its application: 1) do more competitive people take more risks and 2) how to determine early on who is competitive and who is not? Answering these two questions can help in enhancing or revising this exercise in the future.

Activity 3: Speech Interrupted

For their first speech of significant point value, students had to give an informative 4-minute speech on any topic of their choice, as long as it was informative. The day before the speech, I emailed certain students giving them specific distractions to give to specific students (i.e., cell ringing, going to bathroom, cough fit, sneezing, hitting pen against desk). Each student was to distract another student during his or her speech. In addition, whenever a student said a comfort word during their speech (um, and, yeah, you know, so) I would say it aloud right after them so they were aware of what they were doing.

The goal of this was two-fold: 1) have students become more aware of comfort words and of outside distractions and 2) to keep moving forward in presenting and not allowing outside distractions (unless significant) distract them.

This was a successful activity, particularly after all students presented and discussed. All students felt that they did horrible by either confronting or ignoring the distractions and realizing how much they rely on comfort words when they feel nervous or unsure. By hearing me interrupt them constantly makes them aware of how many times they are saying it in a 3 to 4 minute time frame.

The student distraction did not go over so well in that, it caused more friction between students and I think I may move this aspect to another speech exercise earlier in the semester when student relationships and class dynamics have not already been firmly established and relied upon by students.

III. Risk, Resiliency, and Collaboration in the English Classroom

Melissa Sullivan

Metacognition was used as a tool for students to reflect on their writing and analytical skills, and also on the processes they use to develop their arguments and research. The ideas was that students needed to learn how they achieved academic success, and how they could push their own boundaries by articulating what works well for them and what has simply become a comfortable tool or crutch for their work.

Much of my students' metacognitive work was designed so that we were "getting out of our comfort zones." The idea was that risk and resiliency would not really happen with methods students were comfortable with, including having the professor as the authority in the room. So the projects were set up so that part of the risk was that there were no right answers for the professor to provide, the resiliency was necessary because students had to create something, but they had no guide on what was the correct answer or methodology, and the reflective practices were done regularly to focus on skill development and habits of thought and work.

Metacognition, Technology, and the British Fin de Siècle: Initial Stages

This class was a seminar on late nineteenth-century Victorian literature, a period of prolific literary production and transformations, due to the impact of new technologies in print culture, an increasingly reading public, transnational or colonial cultural productions, and other influences that parallel the literary field today. This era seemed well-suited for a project on risk and resiliency because there are so many avenues for students to explore independently, which would still connect to the work they had previously learned in their coursework. We began with a simple exercise on the literary field today, so that students could establish some comfort with

the project. Students used their knowledge of literary trends, history, and reading publics to address open-ended questions on how technology, reading practices, and media will impact literary production and tastes in the 21st century. We then discussed the process of using their own knowledge learned in class to explore unknown trends and ideas--essentially they put together a list of how they could use their coursework to branch out into independent work without a safety net.

Next students took on a project they knew would probably be a failure. They had to turn *Tess of the D'Urbervilles*, a lengthy, emotionally intense novel on morality, modernity, gender, and tragedy into "twitterature," or a 140-character summation of the novel that attempted to reach the emotional intensity of the original text. The students were the judges--and none were pleased with their work. While this project was a self-assessment, to limit the stress for our first attempt, most students were comfortable sharing their work with their coursemates. In general, students were more supportive of their peers' work than their own. But they did learn to identify how risky they were willing to be in their work, and how to gather a useful element of a project that they are dissatisfied overall.

Metacognition, Technology, and the British Fin de Siècle: Distance Reading Project

After our initial activities on risk and resiliency, students embarked on a larger Distance Feading project, for which they were each studying a text they could not read. They were randomly assigned texts, randomly assigned digital tools for the Distance Reading (either AntConc or Voyant Tools), and given particular roles for the class-produced website on the project. So the risks were having to study a book without reading it, using their knowledge of our literary era and their literary analysis skills, as well as new digital tools that were frustrating and

unknown; having to work with the particular tools they were assigned, knowing that at the end of the project, the class would evaluate both tools and identify one as the most useful (thereby stating that half of the class's work was limited at best); having to work as an entire class to synthesize their work and articulate the entire project; having to become experts in work that moved beyond the professor's area of expertise. This final step was crucial, because it forced resiliency. Each student took on a particular area of the group project as a whole, and had to be a leader to their peers and their professor. The Assignment was as follows:

> This assignment is adapted from a project designed by Ryan Cordell, who adapted it from Paul Fyfe. Dr. Fyfe describes his assignment in "How to Not Read a Victorian Novel" *Journal of Victorian Culture* 16, no. 1 (April 2011), which the class read. The assignment was broken down according to the following guidelines:
>
> I. Students were broken into teams of two or three.
> II. Each Team was assigned two novels:
> Team One: *The Daughters of Danaus* and *The Beth Book*
> Team Two: *Story of an African Farm* and *The Woman Who Did*
> Team Three: *New Grub Street* and *The Story of a Modern Woman*
> Team Four: *The Time Machine, Trilby,* and *News From Nowhere*
> III. Each Team followed the following rules
>
> A. You cannot read the novels or their summaries until the end of the project!
> B. You cannot read the authors biographies until the end of the project!
> C. You must work as a team, and develop a presentation together using Google Drive. This presentation should be 8-10 minutes long for groups of 2, and 12-14 minutes long for the group of three, and should include a presentation of your research and an evaluation of the process as a scholar, as a collaborator, and as a technology consumer/producer
> D. You must each take on a supplementary role to support the class project as a whole.
> IV. Each member of the class had an additional supportive role to help develop the project. These roles were as follows:
> A. Timeline Generator
> B. Vloggers
> C. Design and Problem-Solving.

Arguably the project was split between learning to use the technology effectively to achieve the Distance Reading and learning to work collaboratively. This created the support, and some peer pressure, that was needed for students and made the assignment seem more social and manageable, in some ways.

Successes and Failures for Using Metacognition in the Classroom

Student levels of success seemed to be related to three variables: self-motivation, prior experiences with risk in the the classroom, and peer pressure. A few students were graduating in a few months and simply not interested in moving out of their comfort zones just before they were leaving college. About four students previously worked with me in Honors Advanced Writing, a class that I run with a digital class research project that required collaboration, independent research, and developing skills outside of more traditional communication modes. Those students were more experienced with risk and resiliency, and adapted to the project easily. I was surprised by the impact of peer pressure in some ways. The point of this project was helping students identify and articulate their own habits of skills in thought, writing, and critical thinking. Yet working with a partner on the overall research project and knowing they were part of a team seemed to force students to take more risks. The collaboration gave a support system that, while different than the traditional student/professor model, was useful. Students became both leaders and workers in a variety of roles and patterns and, in general, were more resilient with the areas of the project that required partnership.

The most successful students had previous experience with risk and resiliency, a willingness to evolve learning patterns, and an understanding of how recognizing, articulating, and improving academic skills would be transferable to other courses and career paths. Students

needed to "buy in" to the project and recognize how they were not simply jumping through hoops for the sake of a research grant. So while perhaps some people did not discuss the purpose of all of the projects with their students, I found it crucial.

I could not do much about giving students more experience with risk and resiliency once the project began, although it is something I will be incorporating in my advanced (non-GE) courses in the future. Once I realized that students assigned to vlogging about the project were able to vent their frustrations and then move forwarded, I added my in-class discussions and ungraded writing reflections.

Future Considerations for Using Metacognition in the Classroom

I think that while the project was designed to have students carve out their own work as much as possible, more guided reflective questionnaires for vloggers and all of the students would have been helpful earlier on. We were able to move forwarded once students recognized their failures and were able to brainstorm how to move forward, but I think for some students it was too little too late.

Summary of Best Practices

1. Practice resistance and resiliency early and often
2. Design manageably collaborative work; it can be more challenging at first, but also offers more support
3. Recognize and harness peer pressure; students may give up on themselves, but they do not want to publicly let their peers down.
4. Provided guided reflections and discussions for all students regularly

5. Incorporate problem-solving roles and tactics into the assignment from the start, so that students expect unseen challenges.

6. Provide guidance on where to find resources, but do not provide all of the answers.

V. Using Metacognition in the Political Science Classroom

Adam Lusk

In spring 2013, I employed metacognitive strategies in two courses: 1) Introduction of International Relations; and 2) Honors Introduction to International Relations. Both courses were introductory courses that fulfilled two General Education requirements for the Undergraduate College. The first class had seven students, and with only one political science major. Four of the students were second semester first year students, two were third year students, and the last student was a graduating senior. In the honors class, there were two students, a sophomore political science major and a freshman non-political science major.

I focused on using metacognition to teach students about risk-taking and resiliency, or "productive failure." To track this process, I kept a reflection journal about the experience. I have chosen three different teaching strategies that I employed at different points throughout the semester. For each of the activities, I described how they were used in the classroom. Then I analyzed the success and failure of the activities based on self-assessment. I highlighted various issues and problems for implementing these activities in the classroom and how I addressed these problems. Finally, I make suggestions about using each activity in future classes and some broader ideas about using metacognition in the classroom.

Activity #1: Mental Contrasting

The first exercise required students to conduct mental contrasting. Just after the spring break, I asked the students to take out a sheet of paper and answer the following questions: 1)

What are your goals for this course? 2) What might prevent you from reaching these goals? 3) What can you do to overcome these obstacles?

At first, students were hesitant to undertake this exercise. They did not write for at least a minute, almost waiting to see if I was actually serious about the activity. Then they started to ask what I meant, searching for a prompt or an example of what I wanted them to say. I purposely refused to provide them with structure since I wanted to see what they would say. One students in particular then said this activity was not fair and she did not want to write down what her goal was. She eventually did the exercise after I politely asked her to write what she wanted. The students took longer than I expected, especially the first part (goal setting), which took almost 5 minutes for just this one part. They went much faster through the other parts, which I would rather have had them spend more time on. They highlighted some interesting parts of the study habits and behaviors, which might serve as a gateway to show them that they are capable of reaching their goals. Three students pointed out they should be doing better in the class if they would complete the readings before class and then prepared for the on-line quizzes. In fact, all of the students focused on their study habits as the stumbling blocks for the course.

This exercise worked well and brought up some interesting points of discussion. It also helped the students self-assess their progress in the class. It was very useful to have at the midpoint of the semester, giving the students an opportunity to step back and get a big picture of the course – where they are at and what they could do to move forward. Also having it at the midpoint reinforced the idea that it was not too late to do something about their grades and how they could improve their learning.

In the future, I would definitely do this exercise at both the midpoint and earlier in the semester. It required the students to think about what they are doing and how they are learning in

the class and how they could improve without any judging or external imposition. By also having it earlier in the semester, students could feel more empowered where they know that learning depends on their behaviors and actions. Moreover, conducting this exercise more than once might help alleviate the initial resistance by the students.

Besides student resistance, the other significant concern about this exercise is what to do next. In this instance, I chose to provide written comments to each student about what they wrote. I attempted to encourage students and reinforce the positive behaviors that will help their learning, but questions arise about follow up. I was reluctant to have the students share their insights with the other students. I also could not think of ways for students to remember their goals and figure out for themselves how to overcome obstacles on their own. I think that conducting this exercise more than once during the semester might address some of these issues. While it did take about 5-10 minutes of class time and about 15 minutes to write the comments, I felt the return on investment was significant and worth this amount of effort.

Activity #2 - Re-submitting quizzes

A significant portion of the final grade (15%) is determined by 10 on-line quizzes that have 10 multiple choice questions. Each quiz evaluates the student's knowledge of the reading materials and the class notes for one week. The quiz must be taken after the Friday class in which it is assigned and before the following Monday class. Students are allowed to use notes, readings, and outside sources, but group work is not allowed. In order to encourage students to take the quiz and also reinforce concepts that students failed to comprehend, I allow them to resubmit any wrong answers within 48 hours of completing the quiz for 50% credit. However,

instead of telling me the correct answer, a student would have to tell me why they got the question wrong.

This activity did not have the intended effect. In general, students did not take advantage of this opportunity. More important, it did not encourage students to take the quiz. For example, one week only 4 of 9 students completed the quiz. This activity would only work if the students take the quizzes. I hoped this activity would help motivate students, but it did not work. Not surprising, the better students completed the quizzes and would take the opportunity to re-submit their answers, even when they only got one question wrong.

I do think this is an important and potentially effective activity if I can get students to take the initial quiz. This is another example of needing to find ways to motivate students in the classroom.

Activity #3: Muddiest Point

At the end of class, I asked students to anonymously write down "where they are stuck" in the class. I wanted them to think about their problems for understanding the material. I read the student responses and used them to help tailor the next class or any between class communications about upcoming readings.

Some of the students refused to complete the assignment. Only after I said you need to submit a response for your participation grade did they begin to write. They wanted to know what I meant by "stuck" and I prompted them further. After they wrote, they started to discuss among themselves about the class. I let them discuss and then we started to have a productive dialogue about problems they were having with the materials and the concepts.

Therefore, this activity might be better served as a writing prompt to start discussion. In fact, when looking at the written responses, they did not correspond to the significant discussion about problems that the students were having in the course. I would definitely leave plenty of open space for the discussion about student learning. I would also prompt them at the end of the discussions to think of way they could help themselves understand the material better as individual students and as a learning community. This might be very helpful at the start of a course - instead of looking to me to solve their learning problems, they could start turning towards themselves for solving these problems. It seems to be very difficult for students to admit to problems or realize they might be struggling with the material. Even if students are willing to admit that they are "stuck," they don't seem able to put it into words. Some future iterations of this activity could ask this same question but in different ways, e.g. what concepts are still confusing? Another option would have students put together review sheets or exam questions, and then give them to other students to answer. This version would help students realize what concepts they have not fully mastered while also connecting it directly to the class materials. Moreover, this could improve students' willingness to take the activity seriously since this material would help them on their exams.

Activity #4: "Failure Essay"[4]

This assignment required students to write an essay at the end of the course about how they "failed" throughout the semester (below is the text from the syllabus). I highlighted this assignment on the first day of class and mentioned it throughout the semester, in particular noting how they should be keeping a journal about their struggles in the class.

[4] Assignment taken from Edward Burger, "Essay on the Importance of Teaching Failure," *Inside Higher Ed*, August 21, 2012, http://www.insidehighered.com/views/2012/08/21/essay-importance-teaching-failure.

> *This course realizes that progress requires curiosity, risk-taking, and failure. Making a mistake leads to the question "Why was that wrong?" and by answering this question, we are better able to develop new insights and eventually succeed. You'll need to fail regularly to do well in this course because part of your final grade is based on your "quality of failure." At the end of the semester, you'll need to write a 2-3 page double-spaced essay analyzing your failures, why they occurred, and what you have learned from them. I would suggest recording particular failures in your notes or keeping a journal to help you write this essay. Your essay must conclude with an assessment on the learning you have gained through your mistakes in the course (a grade that ranges from 0 – meaning "I never failed" or "I learned nothing from failing" to 10 – meaning "I learned in new and creative ways from my failures").*

Of the 9 students, only 4 students completed this assignment. However, the four students did an amazing job reflecting on their own shortcomings and course problems. Two of the students received an overall grade of A, one was a student who failed the class, and last student earned a B in the course. Each of these students made interesting points. This assignment was very useful and I think helpful for the students.

I also learned a number of different things from these essays. One important point found in both the failure essays of the A students was their fear of failure. As one of the students pointed out, "I've realized where my biggest fault truly lies - I never let myself fail." The student continued later in the paper to regret this approach, realizing "I should be more open to the idea of failing, I should really celebrate in failing, because it actually does bring me one step closer to knowing...I don't want to graduate in 2 years time with the same attitude and perspective that I came in with...I want to spend my time here molding myself into a leader, a thinking, and an innovator. I can only do that, though, when I let my guard down and start failing." Both the failing student and the B student spoke about their lack of productivity and procrastination, realizing they had the ability to produce quality work but their own study habits got in the way. I think this is an important self-reflection on their part that they have the ability to change their

grades and the only thing stopping them is their own behaviors, rather than outside factors. I would really like to be able to follow up and encourage them to follow through and become more self-empowered when it comes to their school work and studying. Perhaps having a reflective essay on failure at the beginning of the semester - how have you failed in previous classes? What could you have done differently? This way the student becomes focused on what they can do over the course of the semester. Another option might be to change the activity from an end of the semester reflection essay into a weekly journal the students would have to hand in for part of their grade.

The main obstacle was getting all of the students to complete the assignment. This was a graded assignment, worth 5% of the final grade, yet students did not complete it. This occurred throughout the semester and more than other classes. I realize this is a General Education course, so this might be a particular problem. I noticed in one of the failure essays, a student mentioned how motivation is a problem when they don't see how a course/subject matter affects how they are going to get a job or relevant for their future. While I spoke about relevance throughout the semester and had them take part in various experiential learning assignments, I believe the students are highly skeptical and biased against the General Education model. There is actually open hostility at times to subject matters outside of their interests and future career plans.

Insights from Using Metacognition in the Political Science Classroom

Using metacognition-based teaching strategies in the political science classroom provided a number of opportunities for students to reflect on their own learning process. Students reflected, at time very insightfully, on their own study skills and habits. Students often realized

that their own study skills were not well-developed for getting a good grade in the class. By increasing student awareness, these activities hopefully encouraged students in the future to improve on their study skills. Future courses in political science, and across the curriculum, could be designed to help build students' study skills and empower students to take ownership of their own learning process. By using metacognitive activities in the classroom, faculty might help address these issues of poor study skills and habits.

However, student motivation emerged as a major problem found in implementing these activities in the classroom. The better students, who needed less work on their study skills and self-reflection, tended to complete the assignments, while the students who needed to significantly improve their study skills did not complete these activities. An important question moving forward should address this problem – how to motivate poorly performing students? This is where studies about metacognition can help faculty design various interventions in the classroom.

Finally, these activities highlighted a tension between a liberal arts general education program and student motivation. Throughout these activities, students commented about how the course was not in their major and not important for the future career plans. This is despite the fact that I not only connected the subject matter directly to their everyday lives, but I also emphasized how the analytical skills learned in the class would be important for their future courses and careers. I spent a significant amount of time designing the course to emphasize these connections to their everyday lives, and then explaining these connections throughout the semester. However, students continually resisted the importance of the course outside of the fact that it was just another general education requirement, and therefore they had to take it or that it just fit in their schedule. Moving forward, I will continue to make these connections for the

students, but I think it is just as important to develop an institutional explanation about the importance of a liberal arts education. Student most likely face broader social, economic, and cultural forces that dismiss the importance of general education in higher education, and there needs to be creation of a community that fosters and holds important these ideals outside of the external pressures.

VI. Inviting Students to take Risks through Drawing: Metacognitive Strategies for Teaching Graphic Design

Maggie Hobson-Baker

During the spring 2013 semester I participated in a collaborative project around the idea of "Building Resiliency and/or increasing risk-taking." I focused on my Graphic Design I course and added the practice of drawing as an exercise to several of the projects. The addition of drawing was a way for students to engage more deeply with the project material. In adding drawing exercises at the beginning of projects, I attempted to present to the students drawing as an exercise as well as a fundamental way to engage with the world. For example students began through design projects on the Coral Reef by viewing images of the flora and fauna and then spending time investigating the relationship of shape through drawing. The exercise of drawing provided the opportunity to look at things carefully, in turn helping to make the students conscious about what they were actually looking at. To add to and support the addition of drawing I introduced the students to the work of Milton Glaser, a leader in 21st Century design. Glaser points to drawing as a fundamental instrument to understand the reality of the forms and subject matter of a design, as a fundamental way to encounter reality. The focus of the Drawing Exercises was that the practice was just an exercise. The students were invited/encouraged/told to not worry about the end result of their drawing but to focus on drawing as an invitation to observe and think about their subject matter. The drawing exercises were done in addition to thumbnail sketches for projects. The Drawing Exercises were a beginning exercise to 4 projects and were compared to the students as warm-ups before a race/game.

Drawing as a Metacognitive Tool in Graphic Design

My goal was for students to develop a deeper understanding and application of the elements and principles of design through spending time drawing. Over the course of the Spring, 2013 semester the students participated in 5 Drawing Exercises that were directly related to class projects. These exercises were not counted as part of the overall grade. They were introduced as an exercise done before students start working on thumbnail sketches for design projects. These exercises were as follows:

Drawing Exercise 1:

As an exercise before work began on the collaborative project with the Science Department on the Coral Reef Illustration and signage, students worked from a projected image of an anemone. Students spent 15 minutes working with pencil and paper, sketching the forms. Students were invited to focus on shape, line, positive and negative space to quickly create an overall composition. Students were asked to think about the elements and principles of design at work.

Drawing Exercise 2:

Students chose a species from the slide show presented by Professor Ullrich to sketch. Students chose the species that would be the focus of their digital illustration project. Students were given 15 minutes to work on this drawing, focusing on sketching, the elements and principles of design as well as overall composition.

Drawing Exercise 3:

Students chose a form from nature to use as the subject of a stylized drawing (sketch). Students were given 15 minutes to explore their ideas with pencil on paper. Students were told to emphasize the chosen principles of design to create a stylized image from nature.

Drawing Exercise 4:

Students chose two-three shapes from nature to use in creating an overall pattern sketch. Students were given 15 minutes to explore their ideas with pencil on paper.

Success and Failures

In general I found that inviting students to spend time before a project begins thinking about their subject matter, "warming up" and stretching is invaluable. When analyzing the grades in Graphic Design I, the projects that began with these exercises were overall stronger. Students seemed to have an easier time transitioning into thumbnail sketches and then to their work within Illustrator. Students were also able to discuss and expand their design vocabulary and experiences during the critiques of these projects as well. Overall, I feel that these exercises helped the students gain a deeper, more holistic understanding and experience of graphic design.

Some of the challenges of adding an exercise of drawing were that many students were timid in the process. Many students began the exercises with the idea that they did not know how to draw. There is often so much focus on the end result in the Visual Arts not taking into consideration the element of practice and looking.

Conclusion

Through experience in teaching Studio Art as well as through focused investigation during the spring 2013 semester, I would conclude that the field of Studio Art easily lends itself to metacognitive approaches in the classroom because of it "hands on" nature. One of the major challenges within the Discipline of Studio Art is the lack of understanding of Visual Art practices and the Creative process within the student body. I would conclude that this is the result of cuts in the arts as well as the arts being placed low on the hierarchy of subjects within the field of education.

To get a true sense of the success of adding metacognitive approaches to the Design Process I would like to employ these methods the next time that I teach this course in order to have comparisons and collect more data.

VII. Conclusion

This compendium highlighted many different metacognitive teaching strategies available to faculty. We took inspiration and ideas from a series of lectures by Dr. Chris Jerstedt through the SEPCHE Building Faculty Capacity in the 21st Century workshops funded by the Teagle Foundation. Each faculty member designed exercises specific to their discipline. Instead of teaching metacognition as a separate course or section within a course, we incorporated metacognitive knowledge in designing the exercises and activities.[5]

The Marine Biology project developed students' self-awareness as leaders and the importance of peer instruction. While the Learning Logs did not work for this course and context, the Critical Incidence Questionnaires generated significant results. Students realized their own strengths, even outside their major fields of study, and built significant transferable skills. Peer instruction and team based learning impacted student learning as well, as seen in the assessment. Using peer instruction impacts students' self-awareness from both roles in the learning process. As the teacher, students become more aware of their own knowledge and the areas that they do not completely understand, while in the student role, they encounter a model that more closely resembles their experiences and therefore becomes more concrete. Peer instruction impacts student perceptions of self-efficacy of being able to learn.[6]

The utility of peer instruction and learning also surfaced in the Risk, Resiliency, and Collaboration in the English Classroom chapter, while the themes of self-awareness and efficacy appeared throughout all of the chapters. The chapter on Public Speaking highlighted the ways

[5] Paul R Pintrich, "The Role of Metacognitive Knowledge in Learning, Teaching, and Assessing," *Theory into Practice* 41, no. 4 (2002): 223.
[6] Gregory Schraw, Kent J Crippen, and Kendall Hartley, "Promoting Self-Regulation in Science Education: Metacognition as Part of a Broader Perspective on Learning," *Research in Science Education* 36, no. 1–2 (2006): 111–139.

that student self-reflection on their own performances helped develop self-awareness. The Political Science chapter recounting using the failure essay in order to increase student self-awareness.

Developing study skills and habits, primary through self-reflection, carries through all of the chapters in different ways. The chapter about the English classroom explicitly deals with developing these skills, while getting students "out of their comfort zones." The drawing exercises undertaken in the Graphic Design course addressed these study skills and habits from a different perspective. Using drawing as a way to observe and think about a subject matter before starting the Graphic Design project allows students to take a metacognitive moment – to step back and strategize about how to complete an assignment. This critical study skill is easily transferred to other fields, such as writing, problem-solving, and speaking.

While we all sought to develop transferrable skills, there remains some important work left to explore on how to do this. These chapters confirm the insights from studies about metacognition and learning that emphasize the importance of relevance. Students need to connect assignments and exercises in the classroom to everyday life. Providing these connections and concrete experiences increases student "buy-in" as pointed out in Chapter 3. The Political Science chapter highlights the problems of student "buy-in" and importance of relevance for student motivations.

Overall, all of the chapters report increased student learning and positive changes in the classroom by using metacognitive based teaching strategies. Using the drawing exercises improved the projects for the Graphic Design course. The Critical Incident Questionnaires and peer instructors impacted student learning in the Marine Biology Laboratory. Political Science had success in the quizzes and final exams by allowing students to resubmit quizzes. These successes present new opportunities in the classroom to revise these teaching strategies, develop

new teaching strategies, and assess their effectiveness. Across the board, there is a feeling that we are just starting to scratch the surface of improving student learning through metacognitive based teaching strategies.