

THE EFFECTS OF REFLECTION AND REVISION CYCLES ON STUDENT
ENGAGEMENT IN HIGH SCHOOL LIFE SCIENCES COURSES

by

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A professional paper submitted in partial fulfillment
of the requirements for the degree

of

Master of Science

in

Science Education

MONTANA STATE UNIVERSITY
Bozeman, Montana

July 2015

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ABSTRACT

This study aimed to measure changes over time in student engagement and student perceptions of course assessment when high school life sciences students were allowed to use “Reflection and Revision Cycles” to reflect on what they were doing well, what they could improve upon, and what their plans were for improvement. Sixty-four students of various ages and in various courses from ninth- to twelfth-grade took part in the Reflection and Revision Cycle exercises throughout the winter term. Data was collected via series of surveys, interviews, focus groups, and anonymous questionnaires during the intervention/treatment period that all asked students to think about their own engagement in the course, and how they perceived the assessment structure of the course.

The collected data failed to directly support the idea that student engagement and positive perceptions of course assessment would both increase over the course of the treatment. However, the more open-ended data instruments such as interviews and focus groups provided much evidence that the inclusion of Reflection and Revision Cycles specifically, and self-assessment and alternative assessment practices in general, can be important drivers of student engagement and perceptions, and that they will be important additions to my classes going forward.

INTRODUCTION AND BACKGROUND

Project Background

In the past few years, I have been increasingly worried about a disconnect between the grades that I was giving to my students at the ends of project periods and the students' own perception of how that project went. I had been exploring ways to use rubrics and other project goal-setting exercises to help the students understand the point of projects and what I expect of them, but I often worried that the grades I wrote down at the end of the project periods were not necessarily reflective of how the student perceived his or her work. In fact, I began to suspect that my perceptions were incomplete without taking in to account theirs.

The problem I observed, in other words, was that I did not feel like my students were getting the most benefit from the grades that I handed back to them at the end of long project periods because they were not also grading their own work--my voice was simply one piece of outsider opinion on the product they handed in. This problem revealed itself in a few ways. The most notable one was the occasional feedback I got from my students that they weren't sure where their grade came from, or that they didn't know what the goals of a project were or how I assessed progress towards those goals.

The challenge I wanted to address through my Action Research (AR) work was how to improve students' understanding and ownership of their grades by including more student self-reflection and self-assessment in my courses. To do so, I created "Reflection and Revision Cycles" in which students would respond to prompts about how they

thought they were doing as students over a given time period and, subsequently, have time to revise their work in light of their self-reflection.

Focus Questions

I was initially drawn to the idea of student self-assessment because it seemed to me that there was great value in having students sit down and grade their own work to see how a grade was created. At the same time, I began to realize the problem that I wanted to address was not just that the students didn't have "a say" in how their grade was formed, but also that they were not truly engaged with the processes of a project-based course if they didn't have time to reflect upon their work *and* have the opportunity to act on that reflection and revise or improve their work. The more I thought about this idea in the past few months, the more I realized that students' self-assessment grades are an important part of including students in the assessment process. Without a chance to reflect and act upon those self-assessment activities, an important chance was lost for them to learn from the process.

With the idea of creating time and space for reflection and revision in my courses, underpinned by the values of student self-assessment, I developed the following AR focus questions: *How will students' self-reported engagement in my courses change if they are provided with reflection and revision cycles throughout the term?*

To further explore the effects of including reflection and revision cycles in my courses, I also developed two sub-questions: *How will students describe the grading system of my courses at the end of a term if they use reflection/revision cycles throughout the term?*; and, *How will my own self-reported experience as a teacher change if students*

are allowed to use these reflection/revision cycles to be part of the grading in these courses?

Support Team

In choosing my support team, I focused first on finding some individuals who I thought understood my style of teaching well, including my strengths and weaknesses, but who also had some diverse perspectives on education so that they could lend me some new insights. I also tried to select some individuals who I thought valued some of the things I wanted to explore this year (the value of reflection, specifically) and who I thought did a good job in that area, as educators or as other members of my school community.

For my support team, I first chose three of my teaching colleagues at Community School: Elliot Jacobs, an English teacher; Bags Brokaw, Director of College Counseling and an educator with many years of experience in teaching and administration at a huge variety of schools; and, Travis Vandenburg, a middle school science teacher and a previous graduate of the MSSE program. I chose these individuals because they all have a lot of experience with project-based curricula and all use some form of formal reflection cycles with their own students.

I also asked Ben Pettit, Head of the Upper School at Community School, to be part of my support team. Ben speaks often about the importance of reflection and self-awareness in our students and is quite knowledgeable about the personal development and growth aspects of education. Furthermore, one of Community School's "themes for the year" that Ben designated for the 2014-2015 school year was reflection.

The final member of my support team this year was a 12th grade student at our school named Jack. Jack is a well-respected member of our school community, an active member of the student government, and a member of my advisory group. Jack's contributions to my support team from a student standpoint were very important.

CONCEPTUAL FRAMEWORK

Introduction

One of the most important themes that I focused on in the literature was the distinction between “traditional assessment” and so-called “alternative assessment.” While both of these terms have plastic and subjective definitions, the literature paints a picture of two very different approaches to assessment and, thus, two very different ways of picturing the role of assessment.

I found two recurring themes in the literature regarding traditional assessment. The first aspect that I found in my research is that traditional assessment is not always conducive to positive relationships between teachers and students. The power dynamic associated with the idea that the teacher in a classroom is the ultimate judge of the students can be problematic, as Anderson tells us in her article calling for a shift to more alternative assessment techniques: “In traditional assessment, generally the instructor alone has the power to make decisions about what is learned and how it is assessed. Students do not participate in making decisions about what is important for them to learn or in determining how well they are learning” (Anderson, 1998, p.8). This kind of class structure, with the teacher as the ultimate arbitrator of the entire educational cycle and deciding alone what is studied and how the course is evaluated, does not always create

the atmosphere of trust that others have found to be the most conducive to real learning (Farias, Farias, and Fairfield, 2010). Traditional assessment does not inherently support these positive relationships, often because the grading, not the true learning processes, becomes the focus of the classroom participants: “It is common to hear comments among faculty that students are reluctant buyers of the service faculty deliver and they really care only about their grades and not about learning” (Farias, Farias, and Fairfield, 2010, p.336).

The second aspect that stood out to me was that traditional assessment techniques often prove to be mysterious or unclear to students and can fail to provide truly meaningful feedback. One of the hallmarks of good assessment is that it not only provides a student with some degree of feedback about what he or she accomplished, but that it also clearly communicates to the student what he or she could work on to improve. But traditional assessments, if not crafted carefully, fail to give students meaningful feedback because they do not provide the students with clear guidelines or goals: “Without providing students with pre-assessment criteria and post-assessment feedback, we place them in the awkward position of having to guess about how to strengthen their work” (Jansen, 2013, p.150). In their study of alignment between student goals and teacher goals in the classroom, Farias, Farias, and Fairchild found that there is often a large disconnect between the feedback that students are getting and the feedback that they feel like they need to improve and/or to prepare for real world applications. They also found that students commonly complained about “the small extent to which teaching

focuses on learning and to which students see this learning as relevant when they enter the workforce” (Farias, Farias, and Fairfield, 2010, p.336).

For these reasons traditional assessment techniques have been shown to “miss out” on many of the potential benefits of a good assessment regime. They often fail to support positive relationships between students and teachers, to give clear feedback to students, and to encourage self-awareness and meaningful room for growth in students. In other words, traditional assessment often proves itself “learner unfriendly, curriculum unfriendly, teacher unfriendly, and student unfriendly” (Ferebee, 2013, p.5).

Direction for AR

The literature suggests that going beyond traditional assessment, simply put, means that the teacher is empowering the students to engage more deeply with the process of learning: “Schools face the challenge of being more open in their assessment and feedback structures, or listening and responding to the views of pupils,” and, “students should be encouraged to share some of the teachers’ roles and, in particular, the most critical power to set curricular goals and assess the achievement of these goals” (Lee and Gavine, 2003, pp.49-50). The literature strongly supports the idea that if students are allowed to have some say in how their progress towards course goals is assessed, they become willing partners in the process of education, instead of the “reluctant buyers” mentioned earlier.

One important goal of moving away from traditional assessment regimes appears to be the fostering of more positive relationships between teachers and students and a more open learning environment: “Better relationships are built in an environment of

trust in which students and teachers can engage in open dialogue for mutual learning. It is in an environment of trust that teachers can and will empower their students to manage their own learning” (Farias, Farias, and Fairfield, 2010, p.337). In a classroom that embraces alternative assessment, the emphasis moves away from having the teacher disseminate evaluations to students in a one-way fashion and focuses instead on “assisting students to learn how to obtain knowledge” (Anderson, 1998, p.7). It becomes the process, not the end results, that take center stage in a classroom that is open to alternative assessment practices. In this kind of educational regime, “instructors assume a facilitator’s role and students assume responsibility for their learning...the focus is on concept development, deep understanding, and construction of active learner reorganization” (Anderson, 1998, p.7). If traditional assessment tends to measure one perception of outcomes at one point in time, alternative assessment tends to measure the process of arriving at those outcomes, and puts at least as much emphasis on that process as it does on the final product.

Furthermore, some studies have suggested that certain types of non-traditional assessment actually encourage character development in students, as non-traditional assessment regimes “may also incite students to confront their self in a way that causes them to establish a link between their intellectual development and their character” (Barrow, 2006, p.358). This idea, while ambitious, has actually been explored and measured in a study on graduate students in programs of design and of business, and it was found that assessment, when well-crafted, “plays an important role in the moulding of individuals to manifest certain skills, behaviours, and attitudes” (Barrow, 2006, p.361).

There is also much evidence to support the idea that alternative assessment practices, such as self-assessment and self-reflective writing, can encourage formative growth in students. Anderson, for instance, found that, as the emphasis of assessment moves away from a punitive model and instead focuses on encouraging growth in our students, “the purpose of alternative assessment is to enhance students’ learning...not to sort or classify the students” (Anderson, 1998, p.10). And Barrow found that alternative assessment provides a means by which “student assessment may be configured to become a force for transforming learners” (Barrow, 2006, p.357).

The literature also supports the point that alternative assessment can create more opportunities to make students feel more empowered to affect their own education. In a study of “learner-centric” classrooms, which utilize alternative assessment practices, positive gains were found with “the learner-centered approach to teaching in which the balance of power shifts towards the learner, the emphasis is on reflection and deep understanding, and learners take on the responsibility for learning” (Farias, Farias, and Fairfield, 2010, p.336). This study also found that alternative assessment practices provide opportunities for students and teachers to work together towards agreed-upon learning goals, and that “this provides the opportunity for the teacher to individually work with each student and strengthen student teacher collaboration and promote trust and interest in learning” (Farias, Farias, and Fairfield, 2010, p.340).

The value of alternative assessment, and self-assessment and reflection in particular, is prevalent in the literature; many people have studied the practices and their impacts on students and classrooms. When Lee and Gavine conducted their study on 56

seventh grade students, with half of the group acting as a standard and half of the group utilizing self-assessment practices, and they collected feedback on the process from those involved, they were motivated by the idea that self-assessment “has a close relationship with more general concepts in the psychological literature such as meta-cognition and self-regulation” (Lee and Gavine, 2003, p.50). Ferebee similarly expressed that, “when students take their learning into their own hands and take ownership in what they are doing and learning, the educational process becomes more interesting to the student.” Reflection and self-assessment “therefore enhances learner autonomy” (Ferebee, 2013, p.6).

Methodologies in the Conceptual Framework

The methodologies in the literature that I focused on when developing my own treatment and instruments were those that measured the outcomes of reflective and self-assessment practices in the classroom. These included collecting feedback from students, faculty, and other members of the school community about attitudes and perceived benefits of reflective assessment and, correlating self-assessment data with other forms of assessment data to investigate alignment.

In her unpublished capstone presented to Montana State University in July of 2012, Brandy Thrasher designed a study to try to measure how self-assessment in her classroom affected “students’ mastery of science concepts,” and “student work completion rates, overall effort, and confidence in science” (Thrasher, 2012, p.7). She collected baseline data through a series of surveys and interviews that the students completed in order to measure pre-treatment levels of confidence and attitude. She also

collected data on participation and test scores for each student involved in the study before beginning the treatment. By collecting similar kinds of data during the treatment and post-treatment, the author was able to analyze the impacts that the introduction of self-assessment practices had on her students.

Two other studies attempted to highlight the degree to which self-assessment grades are aligned with other grades (mostly, teacher-generated grades) to see if self-assessment data was an appropriate measure of learning outcomes. Both of these studies involved statistical analysis of the similarities and differences between self-assessment and teacher-generated assessment scores for various exercises, but also involved surveys and interviews about how the process was perceived by various groups (Sadler & Good, 2006. Ryan, Marshall, Porter, & Haomiao, 2007).

Conceptual Framework Conclusion

This literature review has brought concrete support to what had previously felt like a nebulous idea to me: that alternative assessment techniques and, specifically, self-assessment and self-reflection practices, could be very valuable tools for my students and me. The theoretical implications in the conceptual framework for how students are assessed have become a strong foundation for justifying a new look at assessment in my classroom. References in the literature all point in the same direction: that students deserve to be looked at as individuals and, thus, to be trusted to be part of decision-making involving curriculum and curricular goals and their progress towards those goals.

It was also revealing for me to see that I am not the first educator to struggle with assessment, its current role in my classroom, and the positive role that it could play in my

classroom. By looking at other authors' work in exploring the ideas of self-reflection and self-assessment, thinking about the purpose and value of assessment, and conducting studies on other classrooms, I have been able to follow their lines of research and learn a lot about my own potential lines of research through AR. I have also been able to see how different methodologies of measuring the impact and outcomes of alternative assessment and self-assessment could be used in my own research.

METHODOLOGY

Treatment

Basing my work on the idea that alternative assessment practices such as student self-assessment and reflective assessment have important values in a classroom, my plan for this AR project was to create regular and deliberate time and space for students to complete self-assessment and self-reflection exercises throughout the term.

Specifically, I created "Reflection and Revision Cycles" during days spread out evenly throughout the term. On those days, the students had time in class to sit quietly with their latest projects and other work and answer brief questions on a document I created (see Appendix A) about how they thought they had been doing in class and on projects and what had been challenging. They were encouraged to set one or more goals for improvement-- things that they think they could improve on in the class in general. Because this Reflection and Revision Document encouraged students to think about ways to improve, the students had another day or two to complete any revisions on any recent projects and then turn in both the revised product and their documented reflection cycle to me for their final grade. This process was iterative: a student could reflect and revise

several times, if he or she wanted, before turning in a final product. My goal was to investigate the effects of these Reflection and Revision Cycles on the engagement of my students over time and to see if using these cycles had an impact on student perceptions of the course assessment structure.

After piloting this cycle process in the fall term, I formally enacted the Reflection and Revision Cycles in the winter term. I used the treatment three times with each of the courses that I taught during winter term, although I found that in many ways the treatment became woven into the course structure. That is, each of those Cycles took long enough and created enough dialogue about what was going on in the course that it felt less like three distinct treatment blocks and more like an ongoing endeavor.

Sample

This treatment was used with my Introduction to Biology course (37 ninth grade students across three sections), my Advanced Biology course (17 11th and 12th grade students in one section), and my winter term Environmental Science course (10 11th and 12th grade students in one section). I chose to use the treatment and data collection with all of these groups to try to reach a variety of students (a total of 64) across grade levels.

Our school does not collect or publish socioeconomic data for our students, so I did not keep track of socioeconomic status data of students in my treatment or data collection. However, United States Census Bureau data shows that average per capita income in Blaine County, where our school is located, was \$35,524 between years 2009 and 2013 (U.S. Census Bureau, 2015). We are a private school, which may not be drawing students from a representative population of the whole county's socioeconomic

diversity, but our school gives need-based financial aid to 22% of our students, and financial aid for non-need-based reasons to a total of 45% of our students.

The students in my treatment had a variety of science backgrounds, from the ninth graders who are in their first high school science course to the 11th and 12th grade students who have been through several high school sciences courses.

Data Collection Methods and Schedule

The instruments I used in my AR project were designed to collect data regarding student engagement throughout the process of using reflection cycles, student perceptions of the course assessment structure, and my own experience with the treatment. These included surveys, interviews, and opinion polls on how the students viewed the Reflection and Revision Cycles and how they affected student engagement and their experience with assessment and grading in my particular courses. The core instruments in my AR work were the student surveys that gathered longitudinal (though, relatively short-term in that they were only during this school year) data about self-reported student engagement and student perceptions. I feel that, though these data sources relied heavily on qualitative data and the gathering of opinions, they addressed the “heart and soul” of what I was looking for in my AR questions.

I used two surveys to address my AR questions: a survey of student engagement (Appendix B) and a survey of student perceptions of course assessment (Appendix D). These surveys were sent to every student in the courses electronically three times per term during the winter term, coinciding roughly with the end of big project periods, and completed during class time.

Both of these surveys were supplemented with student interviews that were designed to address the same big questions as the surveys. Interview sessions were conducted with one student at a time with several students from each course, chosen at random. The students, though chosen at random, represented a wide variety of GPAs and overall academic performance. In addition, I adopted short survey questions from Classroom Assessment Techniques (Angelo and Cross, 1993) to try to gather more data about student engagement and student perceptions of course assessment as they related to the Reflection and Revision Document treatment (Appendices C and E, respectively).

I also conducted regular teacher journaling to keep track of notes that I was collecting on student engagement and on my own experience conducting this research.

The research methodology for this project received an exemption by Montana State University's Institutional Review Board (Appendix F), and compliance for working with human subjects was maintained. My data collection matrix is in Table 1, below.

Table 1
Data Collection Matrix

Research Question	Data Source #1	Data Source #2	Data Source #3
How will students' self-reported engagement in my courses change if they are provided with reflection and revision cycles throughout the term?	Student Survey: Survey of Student Engagement	Student interviews	CAT#49: Assignment Assessment (Adapted from Angelo and Cross, 1993)
How will students describe the grading system of my courses at the end of a term if they use reflection/revision cycles throughout the term?	Student Survey: Survey of Student Perceptions of Course Assessment	Student interviews	CAT#43: Teacher-designed Feedback Forms (Adapted from Angelo and Cross, 1993)
How will my own self-reported experience as a teacher change if students are allowed to use these reflection/revision cycles to be part of the grading in these courses?	Teacher journaling		

Validity and Reliability

To ensure validity and reliability with my treatment, data collection and analysis methods, I relied mostly on broad-based survey and interview designs. With the Survey of Student Engagement, for instance, I deliberately tried to get at the concept of “engagement” in several ways through various questions. Because engagement can mean different things to different people (students and educators alike), I felt it was important to craft instruments that would allow the concept of engagement to be approached from different directions. My hope was that, if one were to try to apply some of my findings to

other students in other schools or other courses, the diversity of approaches to the concept of engagement would allow for valid and reliable interpretations of the data.

DATA AND ANALYSIS

Data Discussion

Student Engagement

My primary AR question during the treatment was: “How will students’ self-reported engagement in my courses change if they are provided with Reflection and Revision Cycles throughout the term?” The data collection instruments that I used to explore this question were anonymous surveys asking students to self-report their engagement levels in my courses, a series of interviews with students in my courses, and an anonymous assessment questionnaire that asked students what their perceptions of the Reflection and Revision Document were.

My data collection for this question centered around the surveys of student engagement, which were administered during the weeks of December 15, 2014 (pre-treatment) and of March 2, 2015 (post-treatment). Overall, the data from these surveys was relatively inconclusive as to whether or not student engagement levels changed during the treatment period, though most of the data actually showed a slight decrease in the levels of engagement when all of the students from all of my courses were grouped together. Results from two indicative survey questions are shown in Figures 1 and 2.

The results from these two survey questions, as well as the other questions in that survey, show that most of the responses actually indicate a slightly lower degree of engagement according to the questions that I wrote.

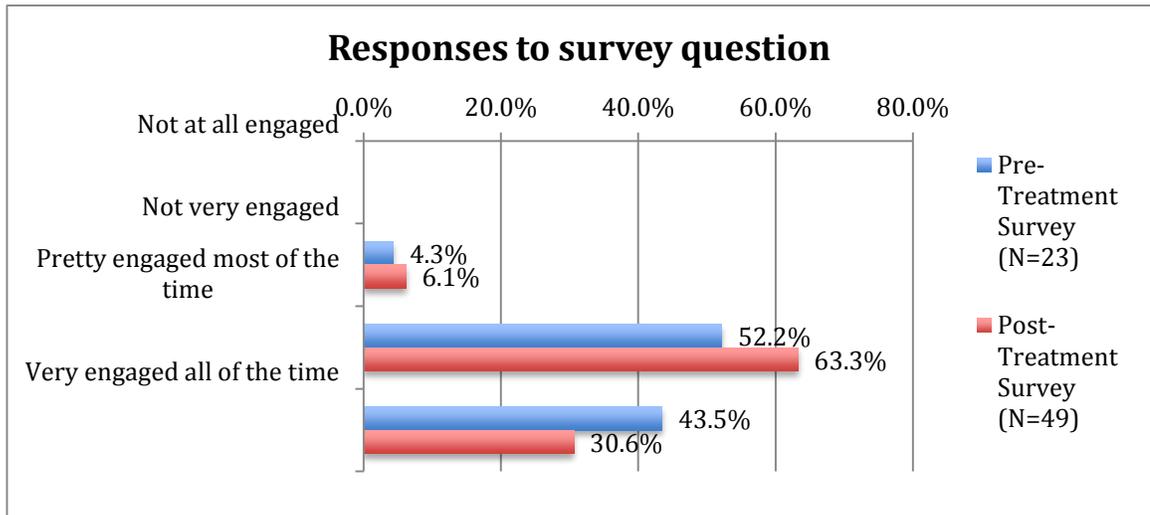


Figure 1. Responses to survey question, “How would you describe your engagement in this course?” with data from Introduction to Biology, Advanced Biology, and Environmental Science combined.

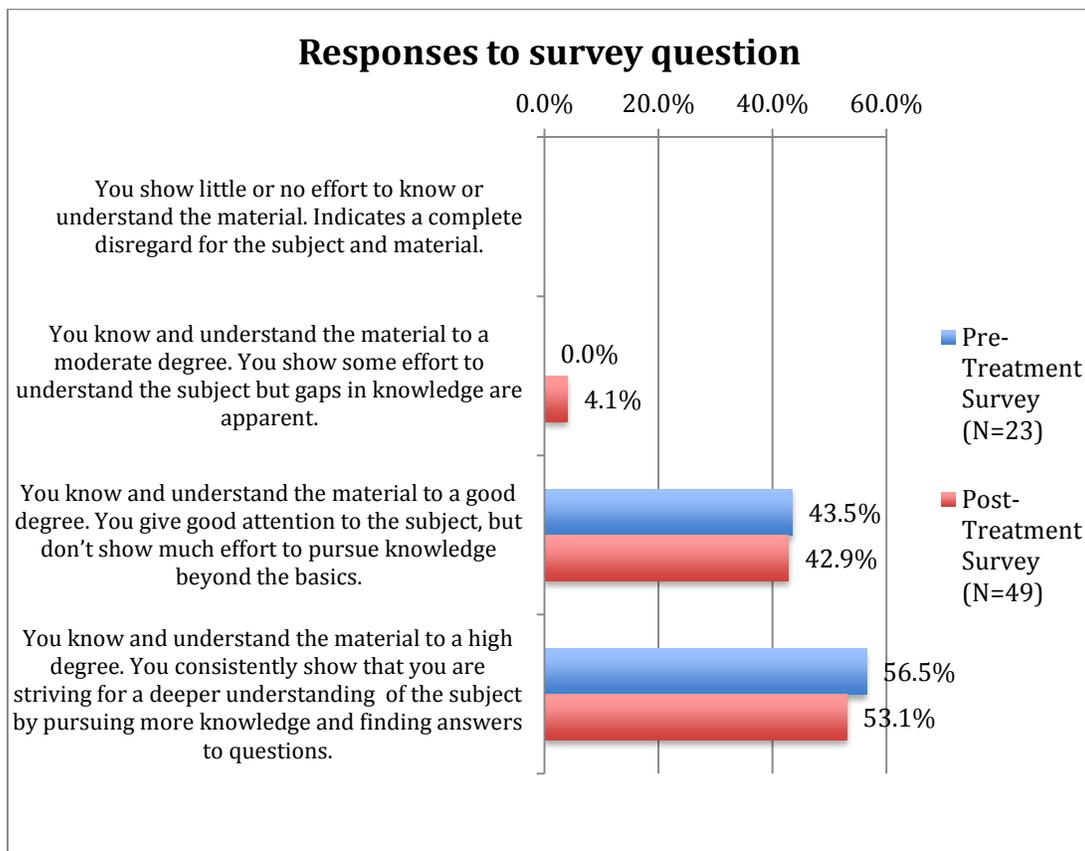


Figure 2. Responses to survey question, “How would you describe how you understand the material in this course?” with data from Introduction to Biology, Advanced Biology, and Environmental Science combined.

Here, sample numbers were small, but I found that Environmental Science shows the most significant decrease in engagement levels according to these two questions (Figures 3 and 4), with many students dropping into lower categories post-treatment.

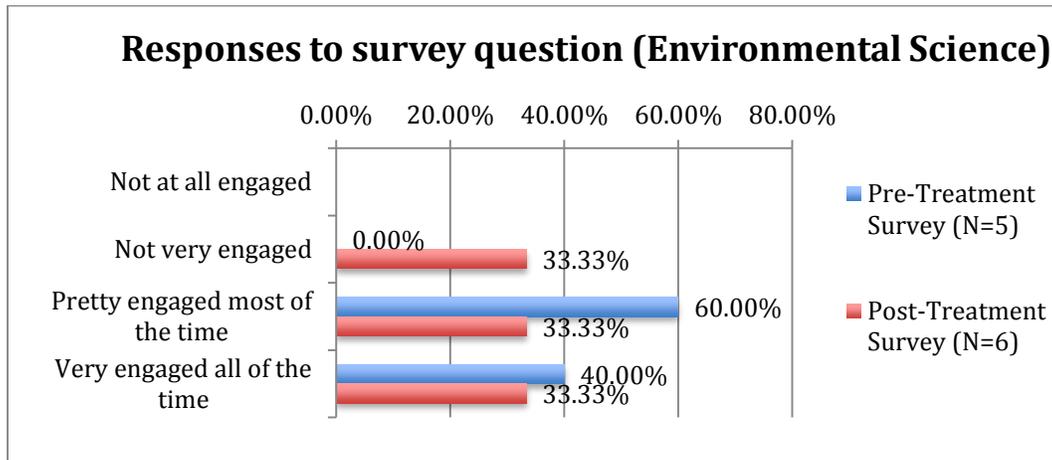


Figure 3. Responses to survey question, “How would you describe your engagement in this course?” for Environmental Science.

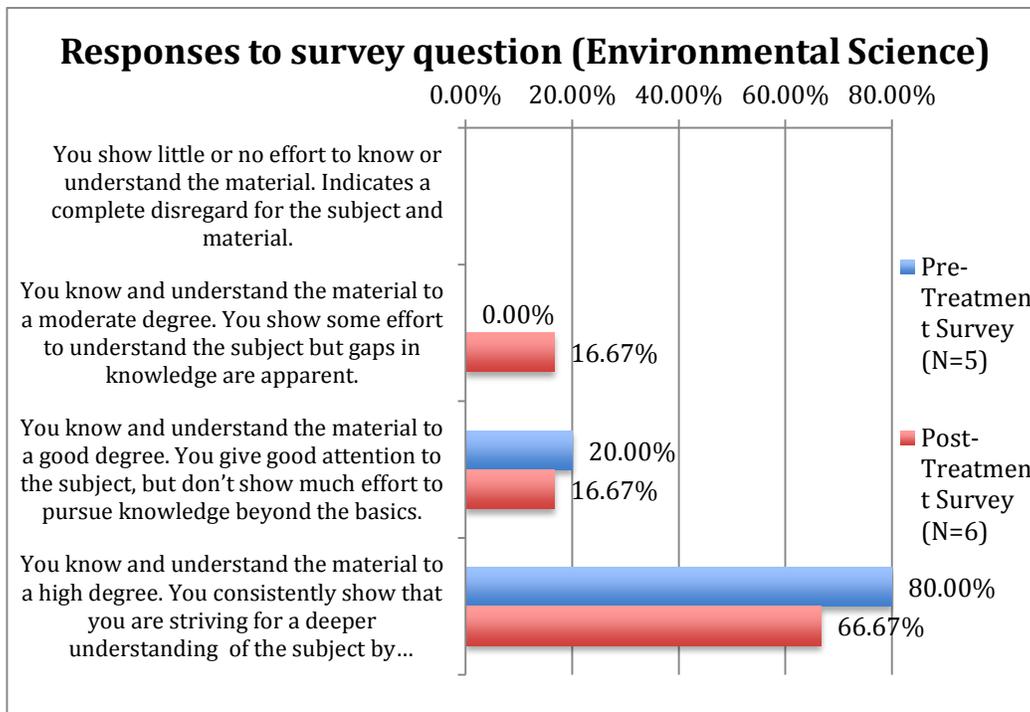


Figure 4. Responses to survey question, “How would you describe how you understand the material in this course?” for Environmental Science.

It strikes me that the data from these surveys, if it is not flat, shows slight decreases in engagement, particularly in Environmental Science, over the course of the treatment. I will address this further in my conclusion, but I believe this might be due to the fact that this treatment was still a novel tool for my students, my courses, and myself, and so the treatment may not have had as much of an impact as it might if it became a more enduring component of my courses. Also, it will be worth looking at the data collection instrument itself to see if it monitored student engagement with enough resolution to show a change over the winter term.

If I look at some of the other data collection instruments that attempted to measure student engagement with regards to the Reflection and Revision Document, however, another, more intriguing picture emerges. In student interviews, many of my students made it clear that they thought that reflection, in theory, was a very helpful addition to their academic world, perhaps raising new questions about how and why student perceptions about the Reflection and Revision Cycles are perceived as beneficial by the students even if that perception wasn't shown in the engagement surveys. Ninth grade students in my Introduction to Biology course told me that, "Opportunity for revision is definitely connected to engagement," and that "If you weren't as engaged in the course, they provide times to look back on what you did learn and what you didn't learn." And, two eleventh grade students in Environmental Science both said that reflection "definitely helps my engagement." Eleventh and twelfth grade Advanced Biology students, on the anonymous assignment assessment questionnaire, said things like, "I think they are helpful to understand myself as a student," and "I feel like it helps

me to reflect on how this class has gone for me and helps me to improve on how to make it better.” Students across all of the courses seemed to agree that “Teachers should know how students feel” about the courses. These kinds of responses show me that, even if the engagement surveys don’t reflect a change, there is something to be gained from using this Reflection and Revision Document as an ongoing part of alternative assessment.

Interestingly, the interviews and the anonymous assessment questionnaire reveal some of the reasons there might be a discrepancy between engagement levels and opinions about the Reflection and Revision Document. An important theme emerged around the idea that the Reflection and Revision Document “could be integrated better into the course” and that the idea of reflecting and revising only works “when we go through it with a teacher.” I also heard from the students that “when we create feedback for ourselves and for a course, and nothing gets changed, it makes less of a difference.” So, I’m drawn to think that the use of this Reflection and Revision Document has a place in my courses, but that there is work to be done on how to make it a more effective part of the culture of my courses.

Student Perceptions of Course Assessment

My secondary AR question during the treatment was, “How will students describe the grading system of my courses at the end of a term if they use reflection/revision cycles throughout the term?” The data collection instruments that I used to explore this question were anonymous surveys asking the students to tell me about their perceptions of the assessment in my courses, a series of interviews with students in my courses, and

an anonymous teacher-designed feedback form that asked students about what they thought about the grading system in my courses.

This question also relied heavily on surveys, this time of student perceptions of course assessment, which were administered in the weeks of January 5, 2015 (pre-treatment) and March 2, 2015 (post-treatment).

Overall, the data from these surveys show a slight increase in how much students understood or favored the assessment structure of my courses. Figures 5 (pre-treatment) and 6 (post-treatment) show the differences in responses over time. For all of the questions, responses in the “strongly agree” category went up between pre- and post-treatment surveys. I will address this further in my discussion, but it will prove difficult for me to ascertain whether this pattern was due to my treatment or if it was just an indication that students were simply becoming more comfortable with the assessment structure in my courses as the year went along and we all got to know each other better.

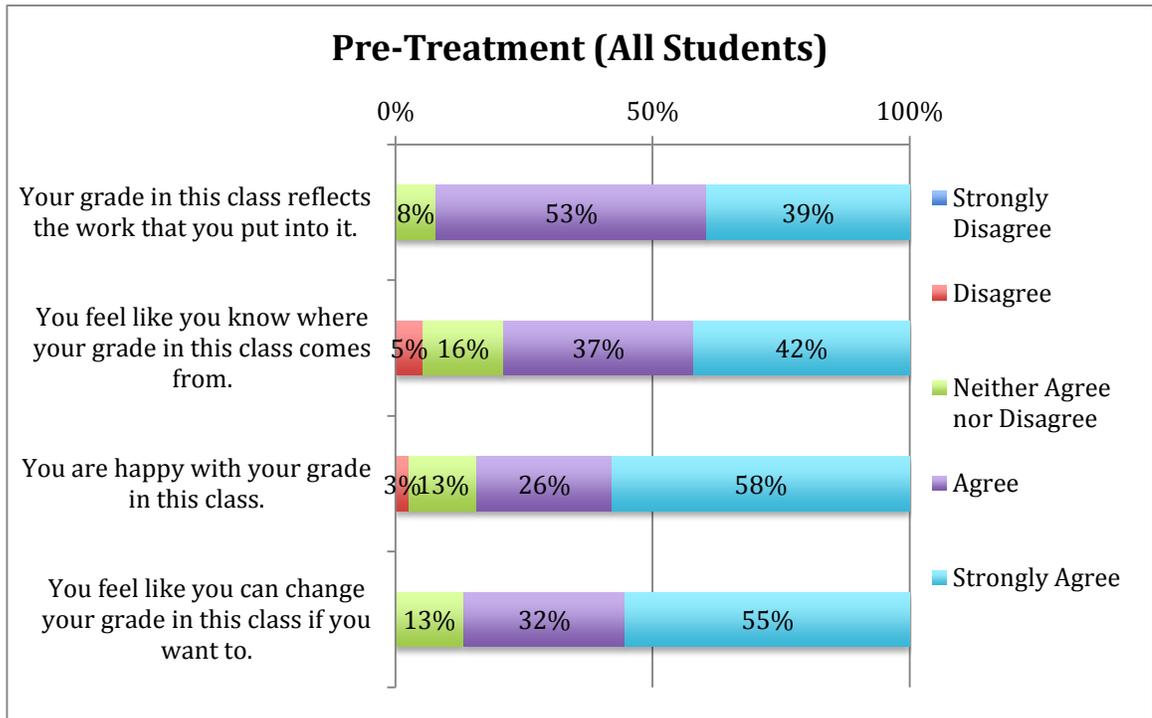


Figure 5. Responses to survey of student perceptions of course assessment, pre-treatment, (N=38).

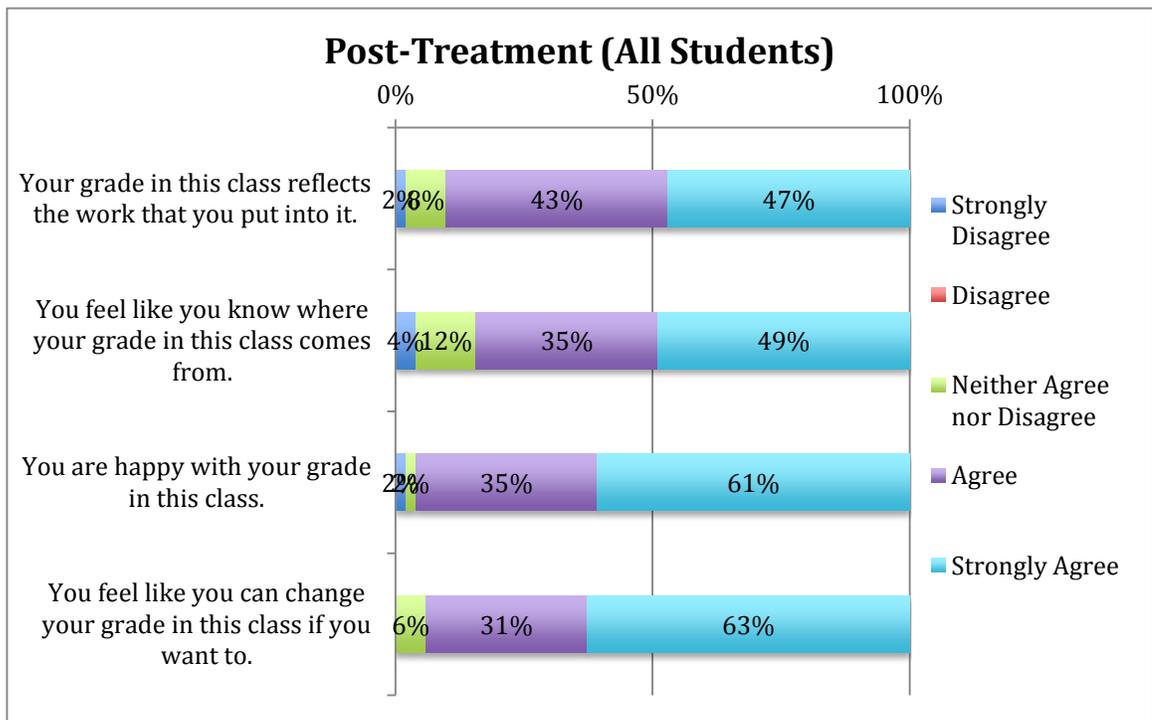


Figure 6. Responses to survey of student perceptions of course assessment, post-treatment, (N=51).

This pattern, of responses moving towards the higher categories over time, was particularly strong with the Introduction to Biology data (Figures 7 and 8). Students in those sections showed the most dramatic changes in Pre- and Post-Treatment responses when I pulled their data out separately. I will explore this pattern further in my conclusion, but it is interesting to note that this could be because the ninth grade students in those sections had the most favorable reaction to the treatment itself, or could be because of other factors that occurred during the winter term that led ninth graders to be more happy with the grading structure of my courses. It is worth pointing out that these are students who have five other courses and teachers in the winter term and that their whole academic “ecosystem” includes a lot of other factors, in school or out of school, that could influence student perceptions of grades.

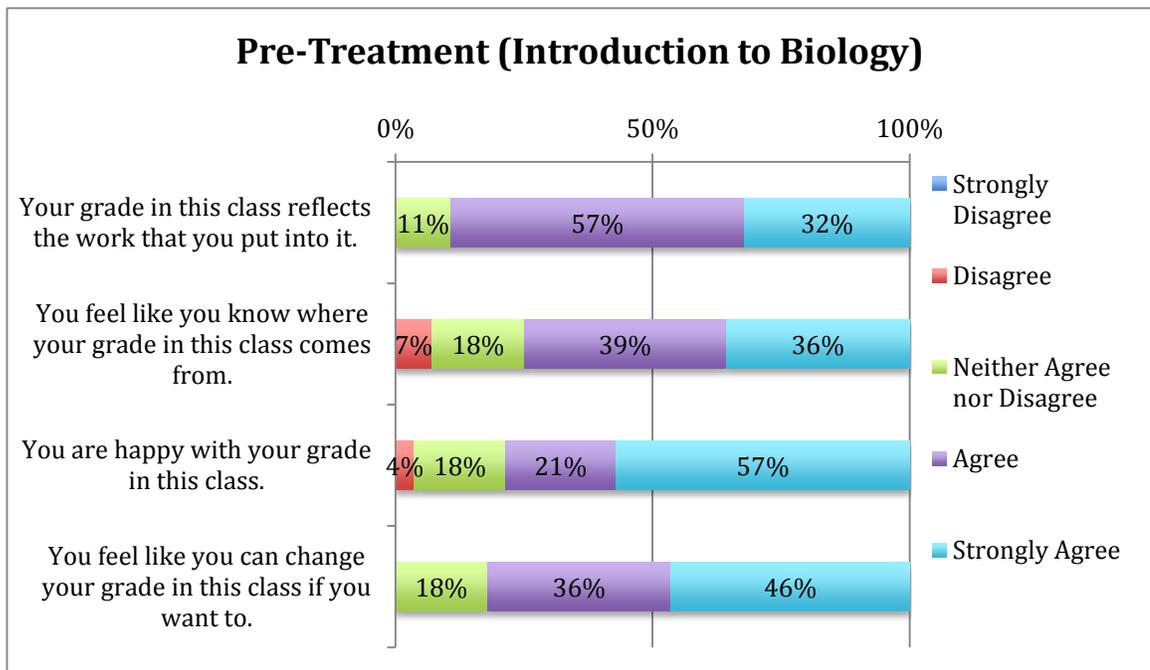


Figure 7. Responses to survey of student perceptions of course assessment, pre-treatment ($N=28$), Introduction to Biology.

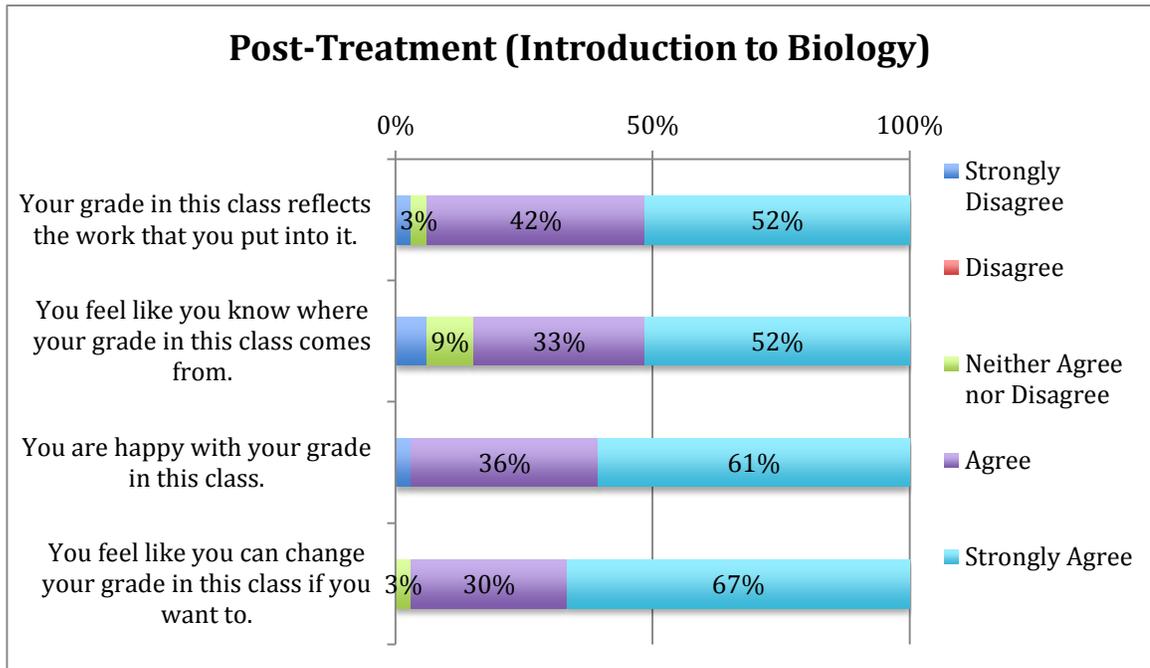


Figure 8. Responses to survey of student perceptions of course assessment, post-treatment ($N=33$), Introduction to Biology.

The supporting data from the interviews and from the anonymous teacher-designed feedback forms were particularly revealing in affirming that students in my courses have, on the whole, positive perceptions of my course assessment structure. The majority of students in my courses, like when they chose “Agree” or “Strongly Agree” on the surveys, seem to be largely satisfied with assessment in my courses. Students told me that they appreciate the “laid-back” nature of assessment in my courses and that they “never have to be scared of getting a test or a project back.” This atmosphere, it seems, helps students focus on “the content of what [a student] is learning instead of the grade [a student] is getting.”

It is worth noting, though, that many of the responses from the interviews and from the teacher-designed feedback form mentioned that, even if students are happy with

their grades, they don't always have a clear picture of how the grades are formed.

Students told me that "the grading could be more clear" and that they "often don't know what their grade is or where it comes from" until the final grades are posted at the end of the term.

While I appreciate some of the positive and constructive feedback about my course structure, it is not clear that students really saw a relationship between course assessment and the Reflection and Revision treatment. It stands out to me that, even if perceptions of course assessment are favorable, the data show some apparent gaps in the connection between course assessment and this Reflection and Revision Document. A ninth grade student in Introduction to Biology told me that she "didn't really know what to write on the document" because she was comfortable with her grade in the course and thus, she "didn't know what she needed to reflect on." Another student, a twelfth grader in Advanced Biology, said that he appreciated using the Reflection and Revision Document, but that "it doesn't directly affect how I think about grades as much as my own learning styles." Several students across all of the grades mentioned that it would help if it "were more directly about grades and grading" and less about the nebulous concepts of "engagement."

Teacher Journaling

Throughout the term, I kept a journal about the process of developing and including the Reflection and Revision Document in my courses and about how I thought the data collection instruments above were doing.

The first major takeaway from the notes in my journal is that, from the beginning, I was concerned about the consistency with which I was exposing the students to the Reflection and Revision treatment itself. Much of the data from my instruments suggest, and I had a sense during the process, that a treatment like this would be more effective if it became a regular part of the course culture, and that having only one term with which to experiment with this activity may not have been enough for me or for the students to really take advantage of. Evidence from this, in my mind, comes from the fact that students described the Reflection and Revision Cycles quite favorably in the open-ended interviews and questionnaires, but noted that they weren't always sure what they were supposed to do with the information gleaned (I think this is something that I could address if I had more time to make the cycles part of the class culture).

Secondly, a major concern that came up in my journal entries was the trouble that I had with my sample sizes changing (quite dramatically, at times) throughout the treatment period. At our school, particularly during the winter term, we have a lot of students who miss school for extended periods of time for athletic competition (ski racing, especially). Because of this, I found it almost impossible to schedule both my treatments and my data collections for days when all of my students were in class. I don't have any specific reason to suspect that the changing sample sizes would have directly affected the outcome of my data collection and/or analysis, but it was something that I found a bit unsettling during certain data analysis steps.

The biggest theme from my journal entries is that I really appreciated the opportunities to take a break from the day-to-day curricula and to have some talking

points, even if they were small and if time always felt short, with students about their engagement and about course assessment. On January 29, 2015, I wrote that I was getting anecdotal feedback from my classes that the students seemed to appreciate me trying out a new tool in my classroom and that “I really believe in the use of the Reflection and Revision Cycles.” I found that, if nothing else, it gave my students and me a reminder to look at the course rubric and learning goals and to reorient to them throughout the term.

But, similar to some of the things that the students were saying in the surveys and interviews that took place throughout the core of the winter term, my journal also included notes about my concerns that “the students are not necessarily getting enough time with them for their engagement levels or perceptions about course structure to really change,” particularly with our busy and inconsistent winter schedule.

As time went on, my journal entries began to focus on ways in which I could tweak or modify the Reflection and Revision document prompts. I wrote about my concerns that “the students aren’t writing very much on their open-ended responses” and I wondered if I should require that students spent more time with the document itself. This journal entry foreshadowed, somewhat, my finding through the student interviews that the students really appreciate the Reflection and Revision Cycles but weren’t always using them to their best capacity.

Summary of Findings

Overall, I believe that my data collection instruments generally supported the idea that the Reflection and Revision Cycles treatment was and could continue to be a valuable part of my courses. In particular, the student perceptions that came out in the

interviews and in the questionnaire and feedback forms really highlighted the fact that the students could see how the treatment has great potential for increasing engagement and positive perceptions of course assessment. This was welcome news for me to hear.

But, my findings also showed that there might be some disconnect between the “idea” of the Reflection and Revision Cycles and the actual implementation of them. It was not clear, for instance, from the students’ surveys that the treatment directly affected engagement or, to a high degree, student perceptions of course assessment. In summary, my data seem to show that the students and I both think that the Reflection and Revision Cycles have potential to be an important component of my classes, but that there are still a lot of details to be figured out in order to make them as valuable as they could be.

INTERPRETATION AND CONCLUSION

Interpretation of Action Research

I began this process trying to address my primary AR question, which asked, “How will students’ self-reported engagement in my courses change if they are provided with reflection and revision cycles throughout the term?” In many ways, I find that the answer has been evasive. The core part of my data that I collected, the student engagement surveys, were relatively inconclusive, leading me to believe that either the treatment was generally ineffective over the course of my study or that the surveys themselves were not entirely accurate in measuring engagement (indeed, “engagement” itself may have been too nebulous a concept for me to measure with simple surveys).

However, it is clear that the students, through the interviews and questionnaires, did show that they saw potential value in the Reflection and Revision Cycles. This was

shown in student comments that I pulled from the data analysis that said things like, “opportunity for revision is definitely connected to engagement,” and that “reflection definitely helps engagement,” This backs up my sense from the literature review and from my own experience, anecdotal or otherwise, that there is educational value in having students develop meta-cognitive skills and self-awareness as learners through deliberate reflection practices, and that this can lead to students being more engaged in their academic world.

In future iterations of the Reflection and Revision Cycles in my classes, I have thought of some important new ways that I could help make them more effective. First, I think that having conferences with individual students about what they write on the Reflection and Revision Document will go a long way towards making the things they write about more concrete and tangible and towards making their plans for the future more supported. Because several students mentioned that they didn’t always know what the point of the Reflection and Revision Cycles was, it will be key for me to work with students in a more “hands on” way to make sure that we are coming up good self-awareness practices and with concrete plans for future revisions of work.

My second AR question, “How will students describe the grading system of my courses at the end of a term if they use reflection/revision cycles throughout the term?” was also an elusive one to answer. The surveys that were designed to look at this question also produced some less-than-convincing data regarding student perceptions of course assessment changing over the treatment period. This said, I believe that the interviews and feedback forms that came out of this question do lead me towards some important

new elements to look at in my courses and teaching style. Most of the data from the interviews and feedback forms seem to show that students are more disconnected from their grading and from the assessment structure in my courses than could really be address through the Reflection and Revision Cycles alone. Many of my students stated that they weren't usually very clear about their grades until the grading period reports ("The grading could be more clear," for instance) and that they didn't think about their grades much except for at those times ("I often don't know what my grade is or where it comes from until the end of the term," for instance). This is probably a problem outside the scope of this particular AR project, but it will be important for me to consider the implications of students in my courses feeling disconnected from their grades, whether it is rooted in negative factors (my grading systems are unclear, for instance) or positive factors (students in my courses feel comfortable and confident in their grades, and grading is de-emphasized in a good way in my courses) or both.

My final AR question was, "How will my own self-reported experience as a teacher change if students are allowed to use these reflection/revision cycles to be part of the grading in these courses?" I think that very positive results were shown in the data, my teacher journaling in particular, which highlight the fact that this process has been enlightening for my students and me. I certainly learned quite a bit, through this process, about how I could develop stronger support for these Reflection and Revision Cycles in the future to make them more effective, but my teacher journal records clearly show that my experience as a teacher found value in the new channels of dialogue that the treatment opened with my students and the way that it drove me to be more transparent and

prepared to share with students the “behind the scenes” information regarding grades, course assessment, project rubrics, etc. The literature review, before my treatment began, suggested that my students and I would both appreciate the honesty supported by student self-reflection rooted in alternative assessment, and I found that to be a major takeaway of this AR process.

Future Study

Future researchers might consider using other triangulation methods to explore several of the components of this study. It would be worthwhile, for instance, to look more closely at the concept of engagement and how it can be interpreted and examined in different ways. I was particularly concerned with the way that my surveys did or did not accurately measure engagement, and with how engagement itself is so hard to define. Future researchers might be able to refine the data collection aspect of student engagement to see if they could find a more accurate way to measure engagement. My work also suggests that trying to correlate engagement data with actual performance data (i.e., quiz or test data on certain material) would be important to explore to see if increased engagement also leads to increased retention of material in a course, or if engagement might act independently of performance on traditional assessment tasks. Anecdotally, when I look back at the data collected during my treatment, I get the sense that students who do better in my courses overall are also those students who are more thorough and thoughtful self-reflectors. If I were to design this study again in a new way, I would certainly find a way to directly correlate students’ grades throughout the term/year with how good a job they do with self-reflection and revision practices. A

research question or hypothesis related to that subject would have less to do with trying to measure students' self-reported engagement over the course of the term and more to do with the degree to which being a good self-reflector leads to performance success in school, which would be a fascinating question.

VALUE

Outcomes and Implications for Teaching

I was pleased to see that the data seemed to support, if only in some ways, what the literature had suggested: that the inclusion of Reflection and Revision Cycles in my courses could help students be more engaged in my courses and help students describe my course assessment structures more positively. I believe this is the case, mostly because of my interview and questionnaire data, even if my surveys seemed not to show that pattern. The strongest takeaway that I see in the data is that when students were allowed to talk about the Cycles openly through interviews and feedback instruments, they generally supported the use of the Reflection and Revision cycles for the same reasons that I had for developing them, including the idea that students appreciate being more involved in their own self-evaluation and in course assessment. While there are still some important pieces of the Reflection and Revision Cycles that I need to address, re-think, and work on for my classes, it is clear to me that it is a worthwhile tool to explore for my classes. The data that showed that students see value in self-reflection supports the use of Reflection and Revision Cycles, but I will be more deliberate about creating conversations with individual students about their self-reflections and plans for revision

and help develop strong support structures for students to follow through with the things they learn from the Reflection and Revision Cycles.

Finally, I feel grateful for the opportunity to have developed the Reflection and Revision Cycles as a treatment, because it is now a component of my courses that I can continue to develop in the future. I think that the inclusion of this reflective piece, rooted in the ideas of alternative assessment, has proven to be a worthwhile exercise for my students. I appreciate having found new ways to open lines of communication between my students and me and to have discovered a new way to learn about my students.

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APPENDICES

APPENDIX A

STUDENT REFLECTION AND REVISION RESPONSE DOCUMENT

Student Response: Reflection and Revision Response (date)

Your name _____

Course _____

- What do you think you have been doing well with lately?

- What has been challenging or what hasn't gone as well lately?

- If you were to revise or change something about what you have been doing, what would your plans be?

APPENDIX B

INSTRUMENT: SURVEY OF STUDENT ENGAGEMENT

Survey of Student Engagement

Participation in this research is voluntary and participation or non-participation will not affect a student's grades or class standing in any way.

What class are you in? *

How would you describe your presence in this course? *

- Your presence in this course is a significant benefit to everyone else involved. You are constantly looking for ways to be engaged and involved. You are self-directed all of the time, and use all of your time in class well.
- Your presence in this course is often a positive addition to the learning environment. You are often looking for ways to be engaged and involved. You are self-directed most of the time, and use most of your time in class well.
- Your presence isn't contributing much to the learning environment. You are not often looking to be engaged or involved with the topic at hand. You are occasionally self-directed, but often are off task.
- Your presence in this course is often detrimental to the learning environment. You show little or no attempt to be engaged or involved, and you make it harder for others to learn. You are unreliable as a self-directed learner.

Why did you choose this option? *

How would you describe the quality of your work? *

- You show great care in your work. What you turn in addresses all components and tasks of the assignment clearly, is free of errors, and shows care for detail and aesthetics. You went above and beyond searching for ways to make the product better.
- You show decent care in the things you turn in. What you turn in addresses most components of the assignment, but there are some errors or missing pieces. It shows decent care for detail and aesthetics. You didn't go much beyond the basics.
- You show some care in the things you turn in. What you turn in addresses some of the components of the assignment, but there are consistent errors and/or omissions. It shows little care for detail and aesthetics.
- You show little care in the things you turn in. What you turn in fails to address many or all portions of the assignment. The product failed to show what the assignment was, and you show no attention to detail or aesthetics.

Why did you choose this option? *

How would you describe how you understand the material in this course? *

- You know and understand the material to a high degree. You consistently show that you are striving for a deeper understanding of the subject by pursuing more knowledge and finding answers to questions.
- You know and understand the material to a good degree. You give good attention to the subject, but don't show much effort to pursue knowledge beyond the basics.
- You know and understand the material to a moderate degree. You show some effort to understand the subject but gaps in knowledge are apparent.
- You show little or no effort to know or understand the material. Indicates a complete disregard for the subject and material.

Why did you choose this option? *

How would you describe your engagement with this project? *

- Very engaged all of the time
- Pretty engaged most of the time
- Not very engaged
- Not at all engaged

Why did you choose this option? *

How do you think having reflection time at the end of projects affects your engagement with the course? *

- It helps a lot. I am much more engaged with the goals of the course.
- helps somewhat. I am a little bit more engaged with the goals of the course.
- It doesn't help much. I am no more engaged with the goals of the course.
- It doesn't help at all. I am less engaged with the goals of the course.

APPENDIX C

INSTRUMENT: CAT#49--ASSIGNMENT ASSESSMENT (ADAPTED FROM
ANGELO AND CROSS, 1993)

CAT#49 – Assignment Assessment

Participation in this research is voluntary and participation or non-participation will not affect a student's grades or class standing in any way.

What class are you in? *

- **How do you feel about the Reflection and Revision Document?**
- **Do you think this Reflection and Revision Document has a place in this course?**
- **How do you think it could be used better?**

APPENDIX D
INSTRUMENT: SURVEY OF STUDENT PERCEPTIONS OF COURSE
ASSESSMENT

Survey of Student Perceptions of Course Assessment

Participation in this research is voluntary and participation or non-participation will not affect a student's grades or class standing in any way.

What class are you in?*

Your grade in this class reflects the work that you put into it.*

Which of the following best describes how much you agree/disagree with that statement.

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

Why did you answer the way you did?*

You feel like you know where your grade in this class comes from.*

Which of the following best describes how much you agree/disagree with that statement.

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

Why did you answer the way you did?*

You are happy with your grade in this class.*

Which of the following best describes how much you agree/disagree with that statement.

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

Why did you answer the way you did?*

You feel like you can change your grade in this class if you want to.*

Which of the following best describes how much you agree/disagree with that statement.

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

Why did you answer the way you did?*

The Reflection and Revision cycles that we are using this year help you better understand your grade and your progress towards the class learning objectives.*

Which of the following best describes how much you agree/disagree with that statement.

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

Why did you answer the way you did?

APPENDIX E

INSTRUMENT: CAT#43—TEACHER-DESIGNED FEEDBACK FORMS (ADAPTED
FROM ANGELO AND CROSS, 1993)

CAT#43 – Teacher-designed Feedback Form

Participation in this research is voluntary and participation or non-participation will not affect a student's grades or class standing in any way.

What class are you in? *

- **What do you think of the grading of this course?**

APPENDIX F
IRB EXEMPTION LETTER



INSTITUTIONAL REVIEW BOARD
For the Protection of Human Subjects
FWA 00000165

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MEMORANDUM

TO: Johannes Thum and Walt Woolbaugh
FROM: Mark Quinn, Chair *Mark Quinn CJ*
DATE: October 27, 2014
RE: "The Effects of Reflection and Revision Cycles in High School Science Courses" [JT102714-EX]

The above research, described in your submission of October 27, 2014, is exempt from the requirement of review by the Institutional Review Board in accordance with the Code of Federal regulations, Part 46, section 101. The specific paragraph which applies to your research is:

- (b) (1) Research conducted in established or commonly accepted educational settings, involving normal educational practices such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.
- (b) (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability, or be damaging to the subjects' financial standing, employability, or reputation.
- (b) (3) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior that is not exempt under paragraph (b)(2) of this section, if: (i) the human subjects are elected or appointed public officials or candidates for public office; or (ii) federal statute(s) without exception that the confidentiality of the personally identifiable information will be maintained throughout the research and thereafter.
- (b) (4) Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if those sources are publicly available, or if the information is recorded by the investigator in such a manner that the subjects cannot be identified, directly or through identifiers linked to the subjects.
- (b) (5) Research and demonstration projects, which are conducted by or subject to the approval of department or agency heads, and which are designed to study, evaluate, or otherwise examine: (i) public benefit or service programs; (ii) procedures for obtaining benefits or services under those programs; (iii) possible changes in or alternatives to those programs or procedures; or (iv) possible changes in methods or levels of payment for benefits or services under those programs.
- (b) (6) Taste and food quality evaluation and consumer acceptance studies, (i) if wholesome foods without additives are consumed, or (ii) if a food is consumed that contains a food ingredient at or below the level and for a use found to be safe, or agricultural chemical or environmental contaminant at or below the level found to be safe, by the FDA, or approved by the EPA, or the Food Safety and Inspection Service of the USDA.

Although review by the Institutional Review Board is not required for the above research, the Committee will be glad to review it. If you wish a review and committee approval, please submit 3 copies of the usual application form and it will be processed by expedited review.