

What are the Effects of Self-Assessment Preparation in a Middle School Science Classroom?

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Abstract. This research was conducted by an urban middle school science teacher who sought to investigate the effects of self-assessment on student performance. A group of students were asked to give themselves a score on each learning target assessed in class and to provide evidence for their decision. Student self-assessment scores were compared to scores given by the teacher to see if students who accurately assessed their own learning scored higher on final assessments than students who did not. Assessment scores between groups of students who completed the self-assessment preparation and students who did not were also analyzed. The data indicates no correlation between the ability to self-assess and achievement. However, further implications on self-assessment at the secondary level are discussed.

Keywords: self-assessment, secondary science, metacognition

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INTRODUCTION

This study aims to understand more about the effects of self-assessment in an urban middle school science classroom and provide more information about self-assessment accuracy at the secondary level. This study was conducted as part of the Streamline to Mastery professional development program.

Studies have shown that there are major benefits to student self-assessment [1]. Students who are able to self-assess become better critical thinkers and are more self-aware. It is believed that students who possess these skills are better able to direct their own learning and become more invested in their own education [1]. By teaching students to become more independent in their own learning and evaluation of learning, students will hopefully be able to transfer those skills to other areas of their life [2].

Additionally, students who are self-aware are more able to monitor their own progress. Self-assessment can help learners locate their strengths and weaknesses and get them to think about what they need to do in order to achieve at a higher level. This individual reflection helps students take ownership of their learning and become more pivotal advocates in their education, rather than just complacent receivers of knowledge [3].

Multiple studies have been done on self-assessment training at the university level. Falchikov and Boud [4] have done a complete analysis of self-assessment studies which included over fifty studies done in higher education. The individual studies compared self- and teacher marks and the closeness of

those marks. The better-designed studies (according to Falchikov and Boud) produced higher closeness results as well as studies that involved students in advanced courses or graduate courses compared to introductory courses. Students in science also produced better closeness results compared to students in other disciplines.

Since the 1989 study, other higher education self-assessment studies have shown similar trends as well. McDonald [5] showed that students who received and practiced meta assessment training scored higher on both easy and difficult assignments than students who did not receive the training. Similarly, Etkina showed that students with higher conceptual gains reflected on their learning in a way that was more articulate and sophisticated [6]. In a longitudinal study, Chen [7] showed that university language students' marks and comments became closer to their professor's while using the same rubric over time.

While there is plenty of literature on self-assessment in higher education, my searches did not reveal many studies done at the secondary level, particularly the middle school level. Research implies that students as young as twelve can benefit from self-assessment and when trained can accurately self-assess with some level of sophistication [3]. Studies also show that self-assessment accuracy increases when clear descriptors are used, specific experiences are related, and functional skills are assessed rather than abstract ideas [8]. These are attributes of a middle school science class and shows that self-assessment can be done at this level.

each unit of study and this is indicated with the color black in Figure 2. The average assessment scores were more dependent on the class section rather than the treatment.

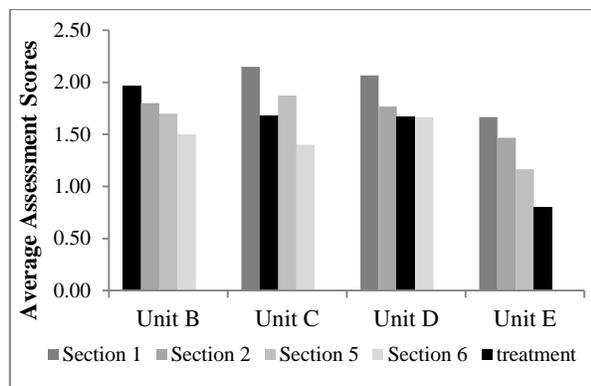


FIGURE 2. Average Assessment Scores for each Unit of Study comparing the Treatment Group to the Control Group

I hypothesized that students would get better at self-assessing over time. However, when looking at the data for treatment group one (which spanned the longest amount of time), the discrepancy scores did not get lower over a 10-week period of using the self-assessment trackers (see Table 1).

Table 1. Discrepancy Value by Question Type throughout a 10 Week Unit of Study.

Date	Average Discrepancy Value	Type of Question
24-Aug	0.94	UC
27-Aug	0.40	DI
1-Sep	1.72	AD
3-Sep	1.00	AD
8-Sep	0.65	UC
22-Sep	1.50	UC
24-Sep	1.95	AD
5-Oct	0.33	ET
13-Oct	0.86	UC
19-Oct	1.04	UC

UC = Understanding Concepts, DI = Designing Investigations, AD = Analyzing Data, ET = Evidence and Trade-Offs

The type of the assessment question seemed to have more of an effect on the average discrepancy values for the first treatment group (N=23 students). Students were able to more accurately self-assess on questions that asked them to design an investigation or determine the evidence and trade-offs compared to analyzing data or explaining a specific concept (see Figure 3). Given that previous research on self-assessment has shown that students are likely to improve their closeness scores over time [7] and

students who engage in self-assessment are more likely to score higher on assessments [5], I predicted that the data in this study would show similar results; it did not. This led me to investigate possible reasons as to why the self-assessment training did not have the effects I thought it would.

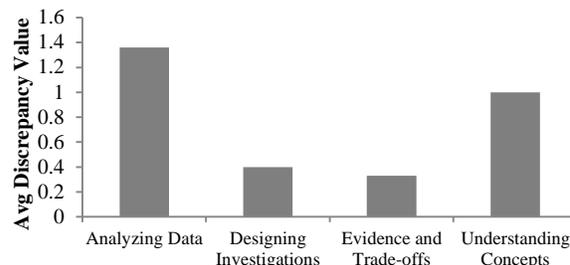


FIGURE 3. Average Discrepancy Values Compared to Question Type

CONCLUSIONS AND IMPLICATIONS

First, I analyzed the survey results and found that 91% of students felt they were aware of their understanding or lack of understanding about a concept. Sixty-one percent of those students showed they could articulate their thinking using specific science vocabulary such as, “I do well writing procedures but I struggle with the independent and dependent variables.” This suggests that many of the students were able to write about what parts of a concept they felt confident in and what parts of a concept they struggled with, even if they were not able to correctly match their own numerical self-assessment score (1-4) with the score given by the teacher. If students showed their ability to articulate what they know and do not know, then why weren’t the assessment scores higher for those students?

I believe the missing piece is what the students do with this information. One hypothesis is that middle school students may not be ready to know what to do even when they know that they do not understand a concept. The self-assessment reflections took place at the end of a lesson which most of the time was at the end of a class period. Many students could accurately write about their understanding of the concept by the end of the lesson, but there were not structured in-class activities set up to help students move further in their understanding. So, students left class knowing what they understood or did not understand, but did not have a plan to address those needs.

Using the self-assessment tracker as a form of formative assessment can help students and teachers. A teacher’s ability to access students’ prior knowledge

and respond to the formative assessment in his or her classroom is an important factor in a student's ability to learn a concept [9]. Using formative assessment tools makes students and teachers more aware of a student's mastery of a concept. The awareness that comes from engaging in self-assessment can only improve concept attainment if that data is put into use and the student can learn whatever piece is still unclear. While thirteen and fourteen year-old students may have the ability to self-assess [3] they may not have the motivation or developmental capability to address those needs independently in order to influence assessment scores.

As a teacher in this middle school classroom, I would imbed a structured plan to address students' needs on a more frequent basis. Often times, one day was taken out of the unit to differentiate for students before an assessment. This data shows that more frequent, even shorter sessions to address misunderstandings would be helpful for students.

Considerable time was spent with the students working with the rubrics and familiarizing students with the language, however it was clear that many students either lost the rubrics, or did not take time to reference them independently. Before each assessment was turned in, class time was given to review the rubrics but many students did not take advantage of this time. Either the students did not find this exercise useful or they were not concerned with their scores.

It would have been valuable to have pre-assessment data for students at the beginning of each unit of study. Next time, I would like students to see the learning targets ahead of time and give themselves a score and rationale for each target and then compare their responses after engaging in the lessons.

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