The Impact of Teacher Feedback on Student Achievement in a Seventh Grade Science Classroom

Jonathan C. Reveal

The Ensworth School. Nashville, Tennessee.

BACKGROUND

This study investigated the effects of teacher feedback on student achievement. Students used a lab report checklist, teacher's written feedback, and a self-reflection process to revise their lab reports. The teacher and the teacher's peers assessed the teacher feedback on student lab reports by using a criteria rubric specifically designed to evaluate the feedback.

Research shows that feedback can improve student achievement. However, my students repeated similar mistakes on their lab reports, so I wondered if improving my feedback, would student lab reports improve also. Thus, I developed research-based feedback strategies that bridge the gap between teacher feedback and student achievement.

According to Classroom Instruction that Works, Research-Base Strategies for Increasing Student Achievement (Marzano, R. et. al. 2001) the four generalizations that should guide feedback are 1) Feedback should be "corrective" in nature. 2) Feedback should be timely. 3) Feedback should be specific to a criterion. 4) Students can effectively provide some of their own feedback. These four guidelines are research supported to improve student achievement. I developed strategies based upon this book's findings for teachers to use that improved teacher feedback and increased student achievement. I developed a lab report skills checklist to guided student lab report writing, a student self reflection, a teacher feedback evaluation rubric that measured the quality of a teacher's feedback. The impact of these process on student was that the work of low-achieving students improved 11.9%, while student work overall improved 3.4%. Teacher feedback improved in four out of the four feedback assessment criteria.

Focus Questions and Sub Questions

1. What is the impact of teacher feedback on student achievement?

Focus Questions

1. Does corrective feedback improve student achievement?
2. Does criterion-specific feedback improve student achievement?
3. Does feedback clarify mistakes for students?
4. Can students effectively provide some of their own feedback?
5. Does feedback improve lab reports?

2. What is the impact of providing feedback on the teacher?

Focus Questions

1. Does a rubric on teacher feedback improve feedback?
2. What is the impact of teacher's time on feedback?
3. Does peer feedback improve teacher feedback?
4. Does feedback improve teacher's sense of success?
5. Does improving feedback improve teaching?

Population

The students involved in the capstone project all attended The Ensworth School. The Ensworth School is a Pre 1st to 12th grade co-educational school. Its population of 1,041 students comes from 36 zip codes surrounding the Nashville, TN area. The minorities are 12% of the student body. Ensworth School provides needs-base financial aid to 11.43% of its students. The Pre 1st to 8th grade is 614 students. The seventh graders in the capstone project were 11 to 13 years old. The topics they have studied in science during the year were scientific method, metric system, density, energy resources, cells, genetics, and human body systems. The students were above average to below average in ability. Student motivation was high because of personal drive or through fear of parental consequences. These students came from well educated and/or very wealth parents. The majority of the students (61%) attended Ensworth since kindergarten. The remaining students (39%) were new to Ensworth in the sixth or seventh grade. The class (N=28) was 43% male, 57% female, and 3.6% African-American. The class year GPA's were 21% A's, 61% B, and 18% C's.

Methodology

With supporting evidence grounded in research, I developed a treatment to explore the impact of teacher feedback on student achievement. The treatment consists of several steps. In Step 1, I handed out a copy of the Lab Report Skills Checklist (Figure 1)and a Lab Report Skills Checklist without any written description for each part of the lab report. I read the description from the skills checklist for each part of the lab report and explained how I would use the checklist to evaluate their lab reports. Working with a partner, the students then translated the "teacher talk", i.e. my written descriptions, into their own words – "kid talk" – filling in the blank copy of the lab report skills checklist. Students then wrote their rough draft lab report using both copies of the lab report skills checklist. In Step 2, I used the lab report skills checklist to evaluate their lab report. I wrote my feedback on their lab report and on the lab reports skills checklist. In Step 3, students received their graded rough draft lab reports with my feedback and the completed lab report skills checklist. I explained where my feedback was on the checklist and how the numerical value on the Lab Report Skills Checklist translated into a letter grade. Students then completed a student-centered reflection questionnaire (Figure 2). Students read my feedback and thought about it. They completed the reflection questionnaire using my feedback and their own ideas on how to improve their lab report. After they completed this reflection, they revised their lab report. In Step 4, I graded the revised lab report using the lab report skills checklist. I returned the graded revised lab report, the rough draft lab report, student reflection questionnaire, and both copies of the lab report skills checklist. I explained how the numerical value on the lab report skills checklist related to a letter grade. It is important to note during this treatment that I used the teacher feedback evaluation rubric (Figure 3) to help guide the amount and type of feedback I gave my students on both their rough drafts and revised lab reports. Thus students experienced this process twice on two different lab reports.

The non-treatment did not involve any of the steps of the treatment. In Step 1, I orally explained to students what needed to be in the lab report. I answered their questions in class about the requirements. In Step 2, students wrote their lab reports based upon my directions. In Step 3, I graded the lab reports and wrote my feedback directly on the lab report without the lab reports skills checklist or the teacher feedback evaluation rubric to guide my feedback. In Step 4, I returned the graded lab reports and gave students the opportunity to revise their lab reports. In Step 5, I graded the revised lab reports. I graded and wrote my feedback directly on the lab report without the lab reports skills checklist or the teacher feedback evaluation rubric to guide my feedback.

Lab Report Skills Checklist

Name: _____

Topic	Criteria	Exemplary	Accomplished	Developing
Title and Purpose	Clearly states the title and questions being addressed.			
Diagrams	Clearly shows all aspects of set up.			
	All labels are present and correct.			
Procedure	Each step is numbered.			
	The procedural steps could be repeated by others.			
Data Collection	Professional looking and accurate representation of the data in tables.			
	Data table Title; column headings indicate what is being measured; column headings indicate units of measurement.			
	Data correctly and completely entered			
	All results are correct and labeled with units appropriately.			
Conclusion	Student draws conclusions based upon their data to answer the purpose question.			
	Student's group data is included and student explained what their results mean.			
	Class data is included and student explained why class data agrees or disagrees with their groups' results.			
	Student's written thoughts demonstrated an understanding of the concepts covered in the lab.			

Exemplary student work goes beyond the requirements.
Accomplished student work meets the requirements.
Developing student work does not meet the requirements.

Student Self Evaluation on Lab Report

Name: _____ Name of Lab: _____

Directions: Read Mr. Reveal's feedback on your lab report and think about what he said. Now use his feedback and your own ideas to reflect on how to revise and improve your lab report. This reflection must be completed and turned in with your revised lab report.

Procedure--Criteria
- Steps could be repeated by another.
- All blue-dot questions are included and answered correctly.

1. What are my strengths in this section?
2. What are my weaknesses in this section?
3. How will I improve this section?

Data Collection--Criteria
- Data is organized into professional looking tables.
- All data labels with units are present and correct.
- The correct title is included for each table.

1. What are my strengths in this section?
2. What are my weaknesses in this section?
3. How will I improve this section?

Conclusion--Criteria
- Conclusion states the meaning of their group's results.
- Conclusion explains why class data is important.
- Conclusion explains why there are differences and/or similarities between group and class results.
- Actual group data is included to support their findings.
- Actual class data is included to support their findings.

1. What are my strengths in this section?
2. What are my weaknesses in this section?
3. How will I improve this section?

Post Lab Questions--Criteria
- All post lab questions are answered.
- Answers demonstrate a strong grasp of the ideas of the lab.
- Student reflections on how to improve next time are meaningful and genuine responses.

1. What are my strengths in this section?
2. What are my weaknesses in this section?
3. How will I improve this section?

Teacher Feedback Evaluation Rubric

Feedback Criteria	5	4	3	2	1	0
Criterion-referenced feedback	Feedback provides a specific and detailed explanation of where student stands relative to a specific skill.	Feedback provides a specific explanation of where student stands relative to a specific skill.	Feedback provides an explanation of where student stands relative to a specific skill.	Feedback provides a limited explanation of where student stands relative to a specific skill.	Feedback provides no explanation of where student stands relative to a specific skill.	No judgment can be made about criterion-reference feedback.
Corrective Feedback	Feedback provides specific explanations of what is accurate and inaccurate in student's responses.	Feedback mainly provides explanations of what is accurate and what is inaccurate in student's responses.	Feedback provides some explanation of what is accurate and what is inaccurate in student's responses.	Feedback provides limited explanation of what is accurate and what is inaccurate in student's responses.	Feedback provides no explanation of what is accurate and what is inaccurate in student's responses.	No judgement can be made about corrective feedback.
Timing	Feedback is given immediately.	Feedback is given within 1 class period or less	Feedback is given within 2 class periods.	Feedback is given within 3 class periods.	Feedback is given within 5 class periods.	Feedback is given more than 5 class periods.	No judgement can be made about timing.
Student generated feedback	Feedback requires student self-evaluate their own progress and allows revision.	Feedback requires student self-evaluate their own progress and allows revision.	Feedback offers student opportunity to self-evaluate their own process and allows revision.	Feedback offers student opportunity to self-evaluate their own process and for allows for limited revision.	Feedback does not offer student opportunity to self-evaluate their own process nor allows for revision.	No judgement can be made about student self-evaluating.

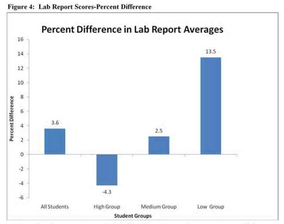
Results

The results are divided into two sections; lab reports and teacher feedback evaluation. These sections helped triangulate the impact of teacher feedback on student achievement and the impact of feedback on the teacher.

Lab Report

The comparison of lab report scores between Non-treatment and treatment (Figure 4) showed that while overall student's lab report scores improved, the improvement depended upon the student. The low group saw the greatest improvement out of any group, while the medium group had a moderate increase in their scores. However, the high group saw a decrease of 4.3%. A possible explanation of this decrease is the high group's lab reports received greater scrutiny with the treatment than during the non-treatment.

Figure 4: Lab Report Scores-Percent Difference



Note: All student-non-treatment N=57, all student-treatment N=52, non-treatment high, medium, and low group N=8, treatment high group N=8, medium and low group N=7

Student Survey and Interview

Students were asked after lab reports to rank which tool helped them the most and which tool helped them the least. The results are summarized in Table 4. These results show that my written comments were the most important tool in helping students revise and improve their lab reports, and the Lab Report Skills Checklist did help students improve their lab reports. However, students did not find the self reflection helpful to revise their lab reports. This table shows that students used different feedback methods differently. While the majority of students found the Lab Report Skills Checklist and written comments very helpful, 11% of students did not find these methods helpful.

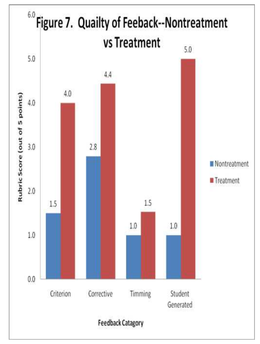
Table 4. Student Ranking of Feedback Methods

Feedback Criteria	5 (most helpful)	4	3	2	1 (least helpful)	Interpretation
Lab Report Skills Checklist*	20% (13)	30% (19)	22% (14)	17% (11)	11% (7)	The majority of students found the Lab Report Skills Checklist helpful.
Written comments*	59% (38)	25% (16)	9% (6)	3% (2)	3% (2)	Students found my written comments the most helpful.
Ideas from talking with the teacher*	9% (6)	30% (19)	44% (44)	13% (8)	5% (3)	Students found talking with the teacher somewhat helpful.
Receiving graded lab reports quickly.*	8% (5)	16% (10)	20% (13)	22% (14)	34% (22)	How quickly the lab reports were returned was not important, however, for some students it is very important.
Doing student reflections*	3% (2)	8% (5)	17% (11)	42% (27)	30% (19)	Students in general did not find the self reflection helpful.

*note: Survey population (N = 64)

Teacher Feedback Evaluation

My feedback improved in all four criteria (Figure 7), however, corrective feedback and criterion-referenced feedback improved, but, timing only saw a slight increase because I struggled to grade lab report with three days. Student generated feedback improved the most because students went from no self reflection on about their lab report to completing the Self Reflection. The rubric measured if students were completing a self reflection, but, no to the impact of that Self Reflection on student lab report. While corrective and criterion-referenced score represent an evaluation of the quality of my feedback.



Conclusion

Interpretation—Impact of Teacher Feedback on Student achievement

During the capstone project, student lab reports scores improved 3.6% between non-treatment and treatment and my corrective feedback (written comments) increased from an average score of 2.8 out of 5. In addition to increased corrective feedback quality, 59% of students ranked written comments as the most important in helpful feedback method.

Lab Report Skills Checklist ranked second most helpful at 30%. These survey results clearly show that written comments were critical in the increased student achievement. Thus there was a connection between my improved corrective feedback and the improvement of student lab report scores.

Students completed the Self Reflection using my feedback and their own ideas on how to improve their lab report. This process, while only nine percent of students did use it to help them revise their lab reports, it forced students to read my written comments and to think about them.
The remaining students stated that they did not find the Self Reflection helpful (26%) and students stated that the Self Reflection explained what they already knew. Despite students' disinterest in the Self Reflection, the benefit to students came from the conversations students and I had about my comments while they were completing the Self Reflection.

Interpretation—Impact of Feedback on the Teacher

During the capstone project, my feedback improved in all four criteria. Criterion-referenced feedback increased from a 1.5 to a 4, corrective increased from 2.8 to 4.4, student generated feedback increased from a 1 to a 5, while timeliness increased from 1 to 1.5 on a five point scale.

The importance of my corrective feedback was illustrated by the comments of a female in my high ability group. She state "If I am told it was right, I want to know, if I am improving on that skill than before or is it just not wrong." The impact of the teacher rubric was not limited to my high ability group students; males in the low ability group saw the highest values (4.8 out of 5) which was a 37% increase.

The impact of teacher's time did effect my feedback because in providing timely feedback meant I had to choose between spending time with my family in the evenings and grading lab reports. While my teaching load provided time for grading, often that time was consumed by other tasks, like responding to emails and meetings. Thus timeliness was greatly impacted by teacher's time, despite the long return times student lab report scores did improve.

Value

•This project developed from a student-teacher process that incorporated four feedback methods that improved student achievement with respect to lab reports.

•This process provided feedback methods for all students regardless of ability level, which lead students to improve their lab reports writing skills.

•This process offers science teachers and other disciplines an approach for developing expectations, conveying those expectations to students, providing feedback to their students in a variety of forms, offer students to apply the feedback to another situation in a timely manner, and evaluate a teacher's feedback, all while helping students develop their writing skills.

•This project answered many questions; it generated several new questions; 1) how can teachers improve their timeliness of feedback? and 2) how do teachers help students generate their own feedback that is meaningful to them? In the future I hope to develop feedback methods that help teachers decrease the time needed to provide feedback, while maintaining the quality and kind of feedback that helps student succeed.