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Using Descriptive Feedback In a Sixth Grade Mathematics Classroom

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Abstract

In this action research of my 6th grade math class, I investigated whether or not my students would improve their ability to reflect on their learning process when they received descriptive feedback from a peer. I discovered the process of giving and receiving feedback was challenging for the students to initially learn, but eventually using the feedback was highly beneficial. Descriptive feedback allowed the students to learn and understand their mistakes immediately, which in turn improved their learning. In my action research, I also began to discover more ways to implement descriptive feedback in my instruction so it could be more effectively for the students and efficiently so there would be less time taken out from instruction. As a result of this research, I plan to continue having students provide and receive descriptive feedback and to find more evidence of how descriptive feedback could influence student achievement.

INTRODUCTION

One of my teaching goals for this last school year was to use formative assessments as a more integrated part of my instruction and as a learning tool for my students. I also wanted my students to be more involved with communicating by using mathematical language to describe their learning process. Since I taught in a classroom where most of my students were identified as gifted and they were mastering basic mathematical objectives, I wanted to challenge the students to be more involved in class discussions and be more communicative of their own thought processes with me and their peers.

As part of our School Improvement Plan at Goodrich Middle School, all the teachers began using formative assessments as evidence for whether or not the students were mastering the objectives and the essential outcomes for their curriculum. A goal I had was to see if there were any effects of using descriptive feedback on these formatives assessments when students reflected on their learning. Over the last eight years I have taught, I learned this big idea of feedback from attending numerous workshops and reading articles from educators such as Marzano, Davies, Stiggins, and Guskey. One of the first places to increase student achievement is to provide students with descriptive feedback. This feedback should focus on the skills students need to learn, or relearn, to master an objective (Marzano, Pickering, & Pollock, 2001). Therefore, descriptive feedback was something I personally started doing at the end of the previous school year, but it was also something I wanted my students to do as well for each other. I wanted to use discriptive feedback to strengthen my students' communication skills and their ability reflect on their own learning process in mathematics.

In my action research, descriptive feedback was used with the students' formative assessments, which was mostly homework in the study. Since formative assessment are not graded and are only used to inform the specifics as to what students needs to be re-taught and what needs to be re-learned for a student to master an objective. So, for the second semester of the school year, I wanted the students to learn how to reflect on their own work, along with their peers' work, and give themselves and their peers descriptive feedback. The descriptive feedback was treated as a dialog between my students and me, and then between the students, as a reflection on their own learning process. The feedback was also used to provide specific skills to what the students were, or were not, learning to master an objective.

This process relates the National Council of Teachers of Mathematics (NCTM, 2000) process standards of communication, reasoning, and representation. Students were given opportunities to reflect on their own work and their peers' work, going beyond just counting problems right or wrong. They would be able to learn how to communicate using mathematical language to evaluate skills they need to master a specific objective. To do this, students also reason which of those skills they are missing or doing well on and they can then find ways to improve their understanding of those skills.

PROBLEM STATEMENT

Understanding the effects of descriptive feedback is worth knowing more about because I believe it could be an effective strategy for increasing student achievement of understanding of mathematics. I want students to be more engaged and have ownership in their learning and descriptive feedback could offer that opportunity. By giving descriptive feedback, it could help students who are not proficient for some objectives

learn the skills they need to be proficient by receiving specific information about what they need to improve.

I also believe descriptive feedback could help students who are mastering the objectives learn effective ways to communicate and reflect on their learning process. Since my higher ability students were already mastering basic computational objectives, I hoped descriptive feedback could also help them become leaders in the class by communicating their thought processes and engage in higher level thinking.

Having descriptive feedback would also give teachers evidence of student learning and inform us on what exactly our students are understanding. This year my team of teachers and I collected data for a goal we created for mathematics, and descriptive feedback would give us data on, not only if our students our proficient, but *why* they are or not proficient in the certain objectives.

LITERATURE REVIEW

In the process of reading research and articles about descriptive feedback, I found three themes. First, what exactly is descriptive feedback and how is it different from regular feedback and self-assessment? Second, how is descriptive feedback used for relearning and what purposes does it have for students? Finally the third, how is descriptive feedback used with formative assessments?

What is Descriptive Feedback

Three well-known educational researchers, Marzano, Pickering, and Pollock, published a book together titled *Classroom Instruction that Works: Research Based Strategies for Increasing Student Achievement* (2001). Through a research technique called meta-analysis, they combined the results of various studies conducted by Mid-continent Research for Education and Learning (McREL) on various instructional

strategies used by teachers in grades K-12. The McREL study identified nine instructional strategies that had the highest probability of enhancing student achievement for all students of all subject areas at all grade levels. Providing feedback was one of those effective strategies with the effect size of .61 and a percentile gain of 23, which is considered to be a large positive impact on student learning.

Marzano, Pickering, and Pollock (2001) cited a well known researcher, Hattie, who after analyzing almost 8000 studies concluded, “The most powerful single modification that enhances achievement is feedback” (p. 96). This feedback can not be just any feedback, however. According to Marzano, Pickering, and Pollock, feedback needs to the “corrective” in nature, timely, specific to criterion, and student involved. Their research found that simply telling a student that their answer on a test is right or wrong actually has a negative effect on achievement, with an effect size of –.08 and percentile gain of –3. The best feedback was involving an explanation as to what is accurate and what is inaccurate, with an effect size of .53 and a percentile gain of 20. How timely the feedback is also plays huge role in the effectiveness on student learning. Providing feedback shortly, but within not seconds, after a test was .72 with a percentile gain of 26. This is opposed to delaying feedback after a test, such as one week, which had an effect size of .26 with the percent gain of only 10.

Rodgers (2006), of State University of New York - Albany, has not done research on studies like Marzano, Pickering, and Pollock (2001). Instead, she has done a lot of research of literature for descriptive feedback and traces the process of feedback all the way back to Dewey’s concept of reflective thinking. Rodgers concludes that the power of students’ description of their own learning, provided in dialogue, is the central role for meeting their needs and creating the trust and community in a classroom.

For example, Rodgers said, “The practice of description is a discipline that nurtures the habit of attending to students carefully” (p. 213). This sensitive information gathered from students will help teachers know more about where their student is in their learning process and then the teacher can take that student to the next step. A process that builds on children’s strengths rather than focusing on their weaknesses is highly positive. Providing descriptive feedback can avoid making evaluative judgments on students and will also give teachers more information to share with that student, their parents, and other teacher as well.

Another important fact Rodgers (2006) emphasizes about descriptive feedback is how it should not be viewed as self-assessment. Descriptive feedback is just that, *descriptive*, and not evaluative. Self-assessment is often evaluated against certain criteria where descriptive feedback is when students have sole authority over their internal experiences as learners. The purpose of descriptive feedback is to gather information about what a student has learned and how he or she learned it as well as for each student to be aware of his or her own learning processes.

Rodgers (2006) explains, too, how descriptive feedback is more of an exploration that helps the teacher and student slow down and really focus on the details of a student’s learning process. With providing descriptive feedback, the teacher and the student can look at what the student has learned, how he or she did or did not learn it, and what the next steps are in the learning process. In other words,

> It is not an evaluation of good and bad but an exploration of what helps and hinders learning and why. In all, feedback gives everyone the chance to slow down, to breathe, to make sense of where they’ve been, how they got there, where they should go next, and the best ways to get there together – a decision made *with* students, rather than *for* them. (Rodgers, 2006, p. 219)

I think the statement about having the decision about a student's learning made with them, rather than for them, is huge for teachers. While Rodgers (2006) focused more on only students providing the descriptive feedback to reflect on their learning process, Marzano, Pickering, and Pollock (2001) focused on the teachers providing descriptive feedback. I believe the same concepts can be used by both the teacher and the student and if both sides are involved, there will be even a higher gain in student achievement. In my action research, I hoped to find these effects of the learning process when the teacher and the students provide descriptive feedback to themselves and to each other. I hope I can now find better ways to make those decisions about a student's learning *with* them.

How Descriptive Feedback is Used for Relearning

Tunstall and Gipps (1996), both from the Institute of Education at the University of London, conducted a small scale research study to create a typology of the different types of feedback identified in a classroom. Unlike Marzano, Pickering, Pollock (2001) and Rodgers (2006) who looked at the effectiveness of feedback, Tunstall and Gibbs wanted to find the different types of feedback. Their small field study involved eight teachers and 49 elementary school aged children and looked at different types of feedback which teachers used during their instruction. The feedback was categorized into four major types: rewarding or punishing, approving or disapproving, specifying attainment or specifying improvement, and constructing achievement or constructing the way forward. The framework for their typology was that feedback can be evaluative, which is judgmental, or descriptive, which is task related.

From their data, with support from other achievement goal researchers, Tunstall and Gipps (1996) believe the first two types of feedback mentioned above, rewarding or

punishing and approving or disapproving, can lead to performance-goal orientation, which is evaluative. The third and forth types of feedback, specifying attainment or specifying improvement and constructing achievement or constructing the way forward, can lead to a mastery goal orientation, which is descriptive. Since today many schools have a mission to have mastery goal orientation, or meeting standards, teachers need to provide feedback that is descriptive. The descriptive feedback should be specific and constructive, focused on individual improvement and progress, recognizable to students' effort, open to opportunities for improvement, and encourages students to view mistakes as a part of learning. When students receive this type of feedback, they will know why they have made the mistakes they have made and will be able to improve their learning (Tunstall & Gibbs, 1996).

Performance-goal oriented feedback was not supported in Tunstall and Gibbs' (1996) research on elementary students, nor was it supported in Codding, Eckert, Fanning, Shiyko, and Soloman's (2006) study. Codding, et al. conducted a field study with numerous interviews and observations on three sixth grade students using a strategy called Cover-Copy-Compare, CCC, with two types of performance feedback, correct or not correct. Codding and his colleagues supported the need to increase computation mastery of basic math facts and believe their CCC strategy is effective. However, when they researched the combination of CCC with performance feedback, their data showed no gains in student achievement of mathematic fluency.

Codding et al. (2006) concluded in their discussion how they may need to incorporate goal setting to provide more effective feedback instead of just performance based feedback. Only telling students whether they got the problem correct or incorrect will not help their achievement. Teachers should try to focus their feedback on specific

types of knowledge, reasoning, and skill needed to master an objective which is also mentioned in Marzano, Pickering, and Pollock's (2001) study. I believe it would be interesting if the previous study were conducted with the CCC strategy and with the two types of master-goal based feedback as described in Tunstall and Gibbs's (1996) typology. After having taught math for seven years, I have now realized how ineffective performance-based feedback is and I wanted to experiment with master goal-based feedback in my action research to find data on how much more effective descriptive feedback is for student learning.

However, I did find a study that used performance-base feedback and still had data showing the improvement on student learning. They had a surprising observation, though, that may describe their positive effects. Vollmeyer of Frankfurt University and Rheinberg of Potsdam University in Germany conducted a research to study the effects of feedback on student performance (2005). Two-hundred eleven university and high school students participated in their study. One-hundred five of these students were told they were going to receive feedback and the remaining 106 students were not told any information. The purpose of their study was to examine how feedback would change the strategy in which a student would use his or her motivation during the process, and his or her final performance. The type of feedback the teacher leaders gave their students was minimal feedback by only saying the number of links out of how many total they had correct when conducting a biology lab testing the effects of three medicines. In the results of their research, they were able to prove that feedback improves performance as well as the quality of strategies a student uses to problem solve.

The unexpected result from Vollmeyer and Rheinberg's (2005) data was that learners performed better from the start when they just knew they were going to receive

feedback. The mere expectation of feedback triggered deep processing of the learning material. They concluded that here, it may not have been the type of feedback, but that maybe learners worked more carefully once they knew that teachers will check their learning outcomes.

Another study on the effectiveness of descriptive feedback was conducted by Bangert-Downs and Morgan of State University of New York - Albany and Kulik and Kulik of the University of Michigan. Their study was a meta-analysis reviewing 58 effect sizes and 40 reports to find the effectiveness of feedback (1991). Their study went more in-depth than Vollmeyer and Rheinberg's (2005) because they were able to find five stages describing the state of the learner when receiving intentional feedback.

The first stage is called the initial stage, where the student reaction depends on the degree of interest, self efficacy, and prior knowledge. The second stage, search and retrieval, are the strategies a student uses to locate the correct answer. For example, if it was simply a memory issue for the students to recall the correct answer they will just make a correction and not really relearn any concept. The third stage, the student responds to the question. Here the student feels some degree of certainty about the response and has some expectation about what the feedback will indicate. The forth stage, the student will now evaluate the response using the given feedback. Here, however, if the student was sure of the response and feedback he or she would receive and they were correct, then the learning will not be impacted. In comparison, if the student was sure of the response and feedback he or she would receive and it was incorrect, the learning will be greatly impacted. However, if the student was not sure of the feedback, the difference of feedback being correct or incorrect will have no impact on student learning unless the student was genuinely interested in correcting his or her

knowledge. The final and fifth stage is the adjustments. The student adjusts his or her knowledge and retains the new knowledge, therefore, beginning another process through the stages for more learning. Through these five stages, feedback powers active learners with strategically useful information, thus supporting self-regulation (Bangert-Downs et al., 1991).

In my action research, I wanted to find more concrete data on the effectiveness of student learning when using descriptive feedback. Vollmeyer and Rheinberg's (2005) study only used performance-base feedback which was only found effective because they found the students performed better when they knew they are going to receive feedback. This study was also done on high school and college age students who I believe may have already developed much of their own learning process. Bangert-Downs et al. (1991) had a meta-analysis on various studies and many school-aged children that showed the five stages in which a student will use feedback. I wanted to find how descriptive feedback will increase student's ability to reflect on their learning process and increase their achievement.

Descriptive Feedback and Formative Assessments

With high stakes tests and the inability to be at high levels of proficiency with our nation's standards, looking at assessment practices within the schools has been a huge focus. Black, author of the famous article for increasing the effectiveness of classroom assessments, "Inside the Black Box" (1998), points out how research has shown that students do not benefit when given only marks or grades. If the feedback on student learning gives students specific guidance on strengths and weaknesses, they will improve their learning. With this guidance, students are then given the means and opportunities to work out the difficulties and show improvement. This feedback should

be done on formative assessments before it is too late. Black describes how teaching and learning must be interactive so teachers can gather a better understanding about their students' progress and difficulties. With this understanding, teachers then can adapt their instruction to meet the needs of all their students. The beliefs are very similar and in agreement with the findings from Marzano, Pickering, and Pollock (2001).

Another educator who has similar views is O'Conner (2002). He discusses how feedback should be clear and concise, so it aligns to the standards of the curriculum. Also, since effective feedback needs to be for mastery of goals and criterion specific, the best place to use descriptive feedback is on formative assessments. O'Conner emphasizes how feedback is the main product in formative assessments. If a large part of a class is not proficient on a certain objective, then some re-teaching will need to happen. Rather than teaching the same thing louder and slower, this type of re-teaching will need to more specific to the skills a particular student is missing.

When a teacher looks at a formative assessment, only looking at the number correct will not show what skill a student needs to be proficient and then the teacher would not know what needs to be re-taught.

> Feedback in the form of words can be very motivational. After a score of 7 out of 10 has been put on a small assignment, there is not much more that can be said. If however, teachers indicate one or two strengths and one or two weaknesses, they have the basis for discussions with individual students to help them improve their work. The basic principle at work here is that words open up communication, whereas numbers close it down – prematurely at that. (O'Conner, 2002, p. 116)

If a teacher fails to look more specifically at what and why a student is not getting correct a problem, then that teacher will be unable to help the student become proficient.

Stiggins wrote the forward in O'Conner's book as well as many other articles, journals, and books on assessment. He also wrote another popular book with three other authors, *Classroom Assessment for Student Learning* (Stiggins et al. 2006), where they emphasize a great deal on descriptive feedback. They also emphasize a great deal on how assessment should be *for* student learning and that it goes beyond teachers using results of an assessment to plan the next steps of instruction. Assessment for learning involves teachers providing descriptive rather than evaluative feedback to students. It also moves students from self-assessment to communicating with others about their own progress. It is student-involvement of assessment for learning that results in the remarkable achievement gains (Stiggins, et al., 2006).

The assessments created to provide descriptive feedback may look different from those designed to provide an overall picture of student achievement. "Descriptive feedback points out to students their works' strengths and weaknesses before it is too late – before the final grade – and it models the kind of thinking we want them to do themselves about their work" (Stiggins et al., 2006, p. 236). Therefore, teachers need to provide their students descriptive feedback on their formative assessments to students can relearn and adjust their learning before they take a summative assessment, which is for their grade. It is not fair to grade students on their formative assessments, because they are still in their learning process. If a class grade is to reflect on what a student knows, then including work when a student is still practicing is not a reflection for what they truly have learned throughout the course. If a teacher grades formative assessment, then an A only reflects quick understanding from students who learn at a faster pace than their peers.

Conclusion

Stiggins et al. (2006), Black (1998), O'Conner (2002), Rodgers (2006) and Marzano, Pickering, and Pollock (2001) have taught me the most about descriptive feedback. They focused on how the quality of the feedback has the most power on student learning. The quality of feedback depends on whether it criterion-based feedback or performance-based feedback. Performance based feedback, such as letter grades or raw scores, can have very little, if any, impact on student learning. Also, when feedback emphasizes it is the learning process that is most important, student learning increases more than when the feedback compares students with one another (Stiggins et al., 2006).

For my action research, I used this information from these educational researchers to create a descriptive feedback process to engage my students in their formative assessments. My goal was to change my practices from performance-based feedback to master goal-based feedback to help students reflect on their learning process. This type of learning process will hopefully teach me and my students what they have learned, how they learned it, and where we will go from that point. I want them to begin viewing their learning process as a cycle and not an end after an assessment.

PURPOSE STATEMENT

Descriptive feedback should be clear and concise so it matches the objectives that will promote student achievement (O'Conner, 2002). Therefore, the purpose of my action research was to see if students could learn to reflect on their learning process of mathematics by giving and receiving quality descriptive feedback specific to the objectives they must learn. Prior to my action research, I gave my students descriptive feedback on their formative assessments and then in the study I began encouraging

them to do the same for themselves and for their peers. I practiced different ways of implementing descriptive feedback in my instruction so it is effective and efficient for my students.

In my action research study, examined three variables:

- The usage of the feedback given to the students by their peers.
- The quality of the feedback they gave their peers.
- The number of students proficient on the objectives after receiving feedback.

I sought to answer the following research questions:

1.) How will descriptive feedback impact students' ability to reflect on their learning process?
2.) What will happen to the students' ability to provide quality descriptive feedback using the skills needed for an objective?
3.) What will happen to the number of students who proficient on an objective after they use descriptive feedback?

Finally, to reflect on my teaching, I asked:

4.) How will I implement descriptive feedback effectively and efficiently?

METHOD

My action research study began the last week of January, 2008, which was two weeks into our second semester. I gave feedback to my students at the very start of the semester then I introduced how they would give feedback to each other. I decided to only implement peer feedback, and not self feedback, since I thought this would help keep more students accountable for completing their homework and participating in the feedback process.

For each homework assignment, I created a form for the students to complete so they could give each other feedback (see Appendix B for feedback form). As a student corrected their peers' homework assignment when we went over as a class, they could use this form to give feedback on any three problems solved incorrectly. The student would have to identify the skill their peer missed and provide an example or

explanations as to how to solve the problem correctly. When we would complete going over the homework assignment, students would get their own homework and feedback form back from their peer. They would then have time to look over their feedback comments and reflect on how their peer helped them. Students then had to write one to two sentences explaining how the feedback they received did, or did, not help them learn the objective.

Students also completed a journal once every three weeks to answer various questions about how they felt about receiving and giving descriptive feedback to their peers (see Appendices C & D for journal prompts). The first set of journaling questions were what I planned to give in my inquiry plan, but as I after I gave the first journal to the students, I realized they were not specific to the research questions I was attempting to collect data for. The journal asked more for how many times the student had to retest and how many objectives they were proficient on. I wanted more information about whether or not they were actually using the feedback. The journal I did not end up using were also hard for the students to respond because the students were still in the processing of relearning and retesting. Therefore, I changed the journal questions to be more specific to how the students actually *felt* about giving and receiving feedback to find out more whether or not they felt the feedback was effective in helping them learn.

There were also two student surveys. The first one I had to revise (see Appendix E & F for the surveys) in the beginning of my study because I found collecting data from this survey format was not manageable. Therefore, I created the survey to be in a table format, so the students could give me quantitative data on whether or not they were using their feedback for each objective. The table also had them record if the feedback helped them learn an objective and whether or not they were proficient on those

objectives. This survey was given after each chapter test where there was three to five objectives included together. At the bottom of each survey, the students had to answer how, or not, the feedback they received helped them learn.

The second survey was given at the beginning, the middle and the end of the study (see Appendix G for survey). The purpose of this survey was to see what the students understood about descriptive feedback, how they felt about giving and receiving feedback, and how often they felt they used the feedback to learn an objective.

I then conducted three sets of individual interviews with the same eight, randomly selected students at the beginning, middle and end of the study. I asked them questions focusing on how they felt about using the feedback they received from a peer, whether or not it was helping them learn and reflect on learning process, and how could receiving feedback improve for them, (see Appendix J for questions). The questions I asked in the interviews, were more meaningful to me because I was able to get more information from the individual students. As one student said, “It is easier to talk about it than write it down on a survey.”

Finally, I kept a Teacher Journal which I wrote in once a week or after a significant event in my room that pertained to my study. I began typing random thoughts and situations that happed throughout the week in my computer, but then revised my journaling to consist of a form which included my three research questions, my teaching question and some guided thoughts to focus on (see Appendix K for journal form). I made multiple copies of this form and put it in a three ring notebook which I kept close by on my desk and took it home for reflection in the evenings. This way, my notebook was easily accessible to continuously write comments and questions as they came up. I made comments about certain observations I made while the students were

giving feedback to each other. I also wrote questions or concerns I had about the process and frustrations I experienced while implementing feedback with my students.

I had the consent of all 22 of my students, but two of those chose not to participate. Those two students did not complete their homework, were unwilling to give feedback to a peer, and many times threw their surveys and journals away. One of the non-compliant students is highly gifted and receives a perfect score on every assessment. He listens and participates in every class discussions, but he does not write anything down unless it is a test. The other student is an English Language Learner (ELL) and takes a significant amount of time to complete his tests and if it is something he does not want to do, he avoids doing it completely.

Collecting all this data throughout my study unfortunately consumed a lot of instruction time which effected the pacing for teaching my objectives in my curriculum. In the very beginning, I also had to make revisions as I found some of my data collection instruments were redundant and were irrelevant for the study. Even with the challenges however, I was able to collect some valuable evidence of effects descriptive feedback has on students' ability to reflect on their learning process.

FINDINGS

I teach one sixth grade math class first period every day to a group of 22 students, 18 of whom are identified as gifted and one who is in the English Language Learner program (ELL). During my action research study in the second semester, my average day of teaching was somewhat altered from my normal schema to incorporate many of the data collection items I needed and to include time for modeling the descriptive feedback process.

Before I even began the study, a normal day in my classroom would begin with a warm up, which consisted of an activity or problem to get my students engaged and interested in the daily objective. Then after about five minutes, we would have a class discussion over some examples on how to solve the problems for that objective. At the end of the hour, which was approximately the last 15-20 minutes of the class, we focused on homework. Students would go over and check the previous day's homework by showing how they completed certain problems to the class and then I would end the hour by summarizing the daily objective and assigning the next homework. The students would have approximately the last five to ten minutes in class to work on this assignment which would be due the following day.

When I began my action research study, the end of the hour for homework time dramatically changed. Since my study involved having students give their peers feedback on their homework assignments, I had to plan my hour accordingly so there would be enough time after instruction to follow through with the feedback process. I felt I needed 25-30 minutes initially, so it took three days for me to adjust my instruction time properly to allot enough time for students to be introduced to the process. When I finally altered my lesson correctly, I passed out the feedback forms to my students after the daily objective lesson and gave them instructions on how the process was going to work.

While passing out the feedback forms, the students exchanged their homework papers. The students would exchange their papers differently every time because I wanted the students to get responses from a variety of peers. I used a variety of strategies when asking students to exchange papers: students would simply pass their papers to the left or to the right a different number of times, they would exchange with

someone else who was dressed liked them or had a similar physical feature, or I would randomly call out their numbers on the attendance sheet and had them exchange with the person who I called with the other random number.

Once students exchanged their papers and had their names on the feedback forms, I would go over the assignment's answers. This was very different for me, because prior to this study I would have the students go over their problems and discuss the answers themselves. To save time during the feedback process in the study, I felt I had to go over the problems. After I went over the problems, the students had to give feedback on three problems which I chose because I felt those problems were the most significant to the objective. If students did not know how to solve the problem, or what to say for feedback, we would discuss the problem as a class on the board.

After the students gave feedback to their peers on the forms and nobody had any more questions, I would have the students pass back the papers with the forms to their peers. Then I would give everyone two to three minutes to look over their comments and to write a quick reflection on how the feedback helped them learn or fix their mistakes. At the end of the hour, the students would then pass their papers in to me so I could review them. Then the students began working on the next assignment for the following day after we summarized the objective.

By the end of the study, this process changed for the better. After a couple weeks of modeling and practice, it did not take as much time as it did in the beginning. In the beginning I had to allot 25 -30 minutes of class time, where as in the end, I only allotted ten minutes. I also stopped telling the class which three problems the students had to give their peer feedback on because the students and I found it much more effective if they were able to choose the three problems that their peer missed. I favored this

alteration because then I knew which problems my students were not getting correctly instead of me guessing which ones they would struggle on and that I thought were the most significant.

Through all of these days in my study, I not only collected a lot of data on how descriptive feedback effects students' ability to reflect on their learning process, but I also found how the students felt and used the feedback they received. The following sections explain and analyze the data I collected for my three research questions.

How will descriptive feedback impact students' ability to reflect on their learning process?

Students saw the value in giving their peers descriptive feedback and most of them used the feedback they received to make corrections on the skills they did not initially understand. The small handful of students who commented how the feedback did not help them was because either their peer did not give them any feedback or the feedback they received was incorrect. For the students who received correct feedback from a peer, they felt they were getting a lot of help and they were very grateful for the feedback because it helped them see their mistakes.

When I looked at students' reflections when they received feedback on one assignment, which I randomly selected at the middle of the study, 11 out of 17 students said the feedback helped them find where they were getting the math problem wrong. One student had no comment, and the other five said feedback did not help them because the feedback they received was not specific enough and they did not get the help the needed. For those five students, this means they were eager to receive feedback for what they did not understand, and when they did not, they were disappointed. (Note:

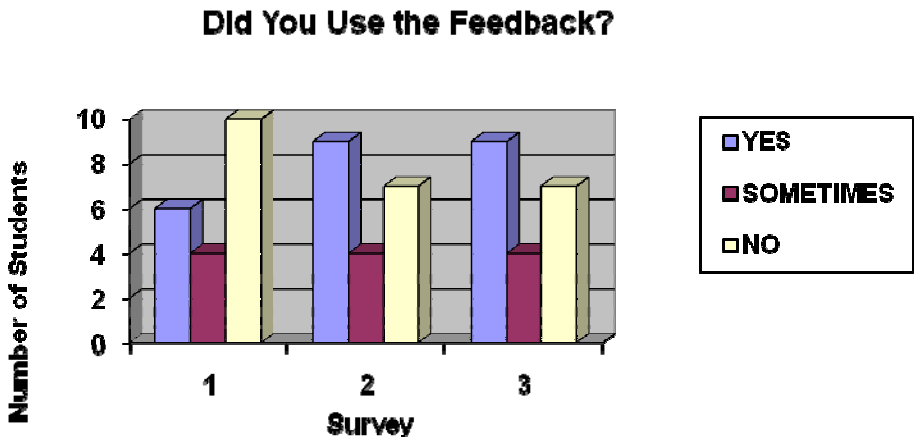
The rest of the five students in my class of 22 were not counted because they were either absent or did not do their homework.)

When I conducted my first set of interviews in the middle of the study, seven out of eight of the students said receiving feedback helped them and that the feedback helped reflect on their learning process. This is a big change from the first set of interviews when these students just looked at me bright eyed with answers like, “I do not know.” This time, they smiled and all, but one, responded positively about the feedback process. I especially liked how one girl responded, “I like giving feedback because then...I can look at my friend’s paper and stuff and I can...like...compare it.” Responses like this example were significant, because it meant students were looking forward to receiving feedback because they reflected on their learning.

In their surveys at the end of the study, all but two students said they felt OK about giving feedback and that “sometimes” it helps them. The reason why they said “sometimes,” was because there are still students who were not being descriptive enough when they were looking at their peers’ paper. I still had two students who did not give *any* feedback to their peers and four students who continued to say things like, “good job” and “show your work.” This type of feedback is just not descriptive enough because it does not still the other student specifically what skills they are missing. Besides those issues, which were also addressed in my second research question, my students were much more eager about giving and receiving feedback at then end of the semester than they were in the beginning. In fact, there was one day that was a shortened period for an early out schedule so I said we were going to not give feedback on their assignment and I actually heard a lot of groans! I also wrote in my journal how, after the test during the same week as the interviews, the students were asking about

their feedback and when they would get their feedback so they can start relearning and retesting the problems they needed. I liked to hear, “Do you have feedback for me, yet?” rather than, “Do you have my test graded, yet?” The fact they were asking for feedback meant they wanted to know how the missed a problem, not just if they missed a problem.

In the same survey as mentioned in beginning the last paragraph, I also asked the students whether or not they used the feedback to help them learn an objective better. The results were not as favorable as I desired at first, but the students had explanations as to why not – and it varied from test to test and student to student, as to when and why they actually used the feedback. See the table below for the results from all three surveys.



The first survey was conducted in February, after three weeks of the feedback process. This was also the time when the comments coming back to me where all about how the feedback was not descriptive enough. Students were saying they did not use the feedback because their peers only said things like, “show your work” or “you got it wrong.” After the first survey, I started spending a lot more class time giving the

students examples as to what types of comments they could give their peers. We made a list on the board of the skills students needed to know to be proficient on the objective. This seemed to help because on the second and third survey, given in late March and early May respectively, I found more students said yes when asked if they were using the feedback they received.

When I combined all three surveys together, I found there were students who did not answer the same on all three surveys. In fact, there were only three students who consistently said they never used feedback to reflect on the learning process and help them learn an objective. Two of those three students were also students who consistently completely their homework, were proficient in most of their objectives and received an A at the end of the semester. The third student never completed his homework and had never received any feedback to receive any help on the skills he missed.

For the students who said they did use the feedback at some point, I found three students said YES on all three surveys. Six students said YES on at least two out of the three surveys, where three others said YES at least once. Then there were two students who said SOMETIMES on all three surveys. Therefore, 41% of my class of 22 students used feedback all or most of the time, 55% of my class used feedback some of the time, and 14% never used feedback at all.

In all, I felt most of my students used the feedback they received from their peer to help them learn an objective better most of the time. From the feedback forms, surveys, and interviews, the evidence shows if a student received *correct* feedback, then they used the feedback to reflect on their learning process to mater an objective. I also

found students need practice and modeling, to know how to give quality feedback to a peer so the feedback is effective.

What will happen to the students' ability to provide quality descriptive feedback using the skills needed for an objective?

In my original inquiry plan for this action research study I had a research question, *What will happen to students' understanding of the essential outcomes if they had to define the knowledge, reasoning, and skills objectives needed to use for descriptive feedback?* I created interview questions and student lists (see Appendix H and I for interview questions and lists) to gather data for this research question. However, at the very beginning of my study after the first set of interviews I found this research question to be completely irrelevant to what I really wanted to find, plus collecting data was impossible. I realized the concept of "essential outcomes" was too new for my students and it involved an unknown language that would take a lot more teaching just to have my students familiar with the terms. Therefore, I decided to take this question and data out of my study and rewrite the research question using the familiar term of "objectives." (My students were more used the word objective because I have the daily objective written on the board and every day the students write what they are supposed to learn in their notebook at the beginning of the hour and at the end of the hour they summarize the daily objective.) The revised research question that guided the rest of my study was changed to, *What will happen to the students' ability to provide quality descriptive feedback using the skills needed for an objective*?

Another reason for the change was because I really wanted to put a strong focus on having my students to give their peers more information other than just, "Show your work," and "Ask the teacher for help next time." Quality descriptive feedback would be

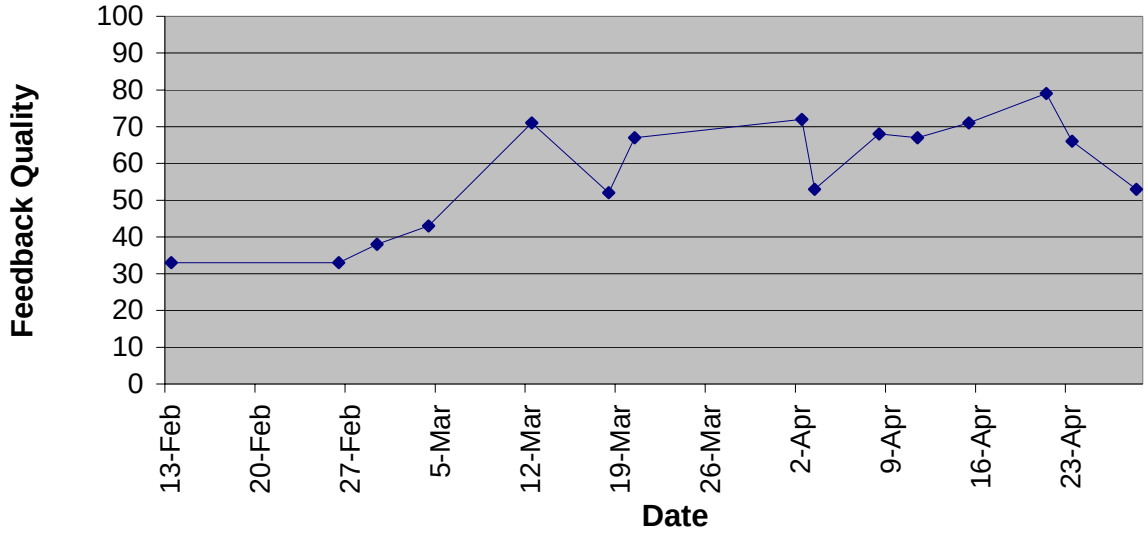
more beneficial than just counting a problem right or wrong because it would tell students where the mistake was made and then hopefully they would be able to understand the concept better so they can master the objective. I felt that in order for the feedback to be effective, where a student would actually use it to reflect on their learning process, the feedback would have to include specific skills needed to be proficient on that objective.

Having students give each other quality feedback using the skills needed to master an objective took a lot of training, modeling, and practicing. Eventually, the students became better as they started to focus more on the specific skills missed on a problem and then they provided their peer with examples and comments that were helpful. The form I used (see Appendix B) was very effective because it allowed students to choose a problem that they were more comfortable with solving so they could give quality feedback to their peer by describing the problem more clearly. I initially created another form (see Appendix A for first feedback form) that was not as detailed as this form. After the first day, I learned my students did not understand how to give feedback and that the process was too confusing for them since they could not identify the skills missing for an objective. Having sixth graders describe to a peer how they missed a problem was a lot more difficult than simply counting the problem right or wrong. Therefore I then used the new form which provided a clearer template for comments and reflection that guided the students to be more specific.

I concluded that the students were giving their peers better feedback by the collection of the feedback forms from the 16 assignments I gave throughout the study. I evaluated the quality of the feedback the students were providing by using a four point rubric (see Appendix L for rubric) to give them a feedback value. I focused on whether

or not the students were able to identify the skill that was needed to master the objective and give their peer an example or explanation on how to solve the problem correctly. If the student was able to do this for their peer, I scored the homework feedback as a four. I collected the first assignment on February 26th and scored each feedback form and found the class average. The average value of the first homework feedback was a 15 points out of 44 which I called a class average feedback value of 34%. The feedback remarks were mainly, “Show your work” and “Do ALL of the assignment,” and only one homework feedback scored a four, were the others were mainly one’s, two’s, and a couple three’s. Also, only 11 out of 22 students completed their homework, so the average was affected by the limited number of homework feedback forms to score.

For the eighth assignment, there were 37 comments made from the 17 students who completed their homework. When I looked at those comments, 23 of the 37 comments were descriptive and scored a four and the class feedback value was a 72%. An examples of quality feedback was, “These two lines are not just intersecting...they are perpendicular because when they intersect they made two right angles, see?” (A picture of the lines then followed.) After 13 assignments, the students had a quality score of 79% and I also discovered 20 out of 22 of my students completed their homework. The feedback values because to score higher because students were able to identify the skills missing and give their peer an example or explanation as to how to fix the problem. Following is a chart graphing the quality of the feedback by showing the average feedback values for the 16 assignments I collected throughout the study.



The slow increase in the quality of the descriptive feedback resulted when I began taking more class time to remind the students to be more descriptive. There were a handful of students who struggled with giving descriptive feedback because they did not know how their peer got the problem wrong and some wanted to just count the problem wrong. I encouraged my students every day to speak up so we could go over the problems on the board during our class discussion time so they can learn the skills needed to solve the problem and be proficient on the objective. This modeling and practice took up most of our time in the beginning of the study because it was very difficult for the students to become comfortable and natural with finding *how* their peer solved the problem incorrectly.

After evaluating all the data, I also found that the forms for the feedback were definitely beneficial because other than a few assignments, the overall quality of the feedback was rising. The last four assignments I collected were when I had the students not use the forms and it shows there was a definite decrease in the quality of the

feedback. The first assignment was April 20th, where the students were still using quality descriptive feedback. But then for the three assignments following, I noticed the students were hardly giving any feedback at all on their papers. They resorted back to just using the red pen to count the problems wrong or right, as they did in many of their other classes, which was not using the skills to provide descriptive feedback

Other evidence I gathered to tell me the students were giving each other better feedback was through my second set of interviews and surveys. During the interviews at the end of the study, the same girl who responded saying that the feedback was not descriptive enough then said, “people are being much better.” Then another student said, “I like it when they like put stuff on my paper to show me where I made..you know..my mistakes.” Seven out of the eight students I interviewed said they use the feedback they received because it helped them. The one student who said it did not was because he never did his homework or class work so he never received any feedback.

In the surveys, as shown in the first table, 13 out of the 20 students who did their homework said they did, or at least sometimes did, use the feedback to help them learn. This is higher than the first survey where only 10 students used the feedback. If students are able to use the feedback, then this shows me also that the students were more descriptive.

With this descriptive feedback, the quality of their homework also showed improvement. More students showed their work and wrote the problems more clearly. I had an issue at the beginning of the study where it was hard for students to give feedback to their peer because they did not show their work. I kept telling the students it is nearly impossible for someone to help them if they did not explain or show how they

solved the problem. On the 13th assignment, 18 out of the 20 students who did their homework showed their work for every problem.

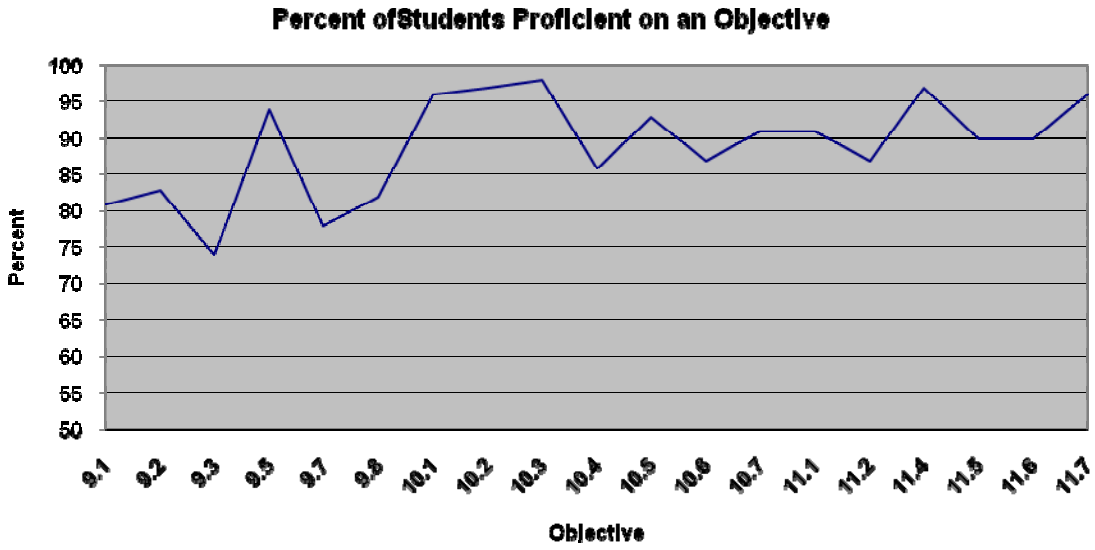
Therefore, I found students are able to give quality descriptive feedback when they are able to identify the skills needed to be proficient on that objective. This took a lot of modeling and practice because it was more difficult for the students to give quality feedback to a peer instead of just counting the problem write or wrong. This is a habit that will be very hard to break, as shown at the end of my study of two months when I let down my pressure and eliminated the feedback forms, most of the students fell back to the old way of checking their peers' papers.

What will happen to the number of students who are proficient on the objectives when they use descriptive feedback?

Finding evidence that descriptive feedback helped the students become proficient on the objectives was very difficult. The biggest struggle I had with collecting data for this research question was not having anything to compare. Being my first year teaching sixth grade, I could not compare this group of students to any other class I taught. Also, the objectives were very different from one chapter to the next. Of the 16 objectives included in my study, eight of them were algebraic, four of them were computational, and four of them were geometrical. The level of difficulty of these objectives was also inconsistent, so it made it even more challenging for me to relate it to whether or not the students receiving descriptive feedback had any effect on their proficiency.

A positive sign that I did find was that most of my students were proficient on the objectives at the end of the study. The average number of students who were proficient did not go below 80% for the remainder of the study while using descriptive feedback. There were 18 objectives I recorded during the study for all 22 students and the chart

below shows the average number of students who were proficient on each objective. To be proficient, a student had to receive at least an 80% on the test for that specific opjective (see Appendix M for LPS objectives).



Even though I do not have data that shows that this increase was due specifically to the descriptive feedback process, I believe from the data I received from the student surveys and interviews that it did. Since most of the students told me the feedback they received from their peer was helping them learn better, it is hard for me to imagine the feedback process was not beneficial.

How will I implement descriptive feedback effectively and efficiently?

The biggest concern teachers have when implementing a new strategy is time. One comment I wrote all over my journal was “TIME TIME TIME!!” I found having students give a peer descriptive feedback was extremely time consuming. When I started my study, there were some days where the process of feedback took more than half of the class period. After three weeks of having my students write feedback to their peers, I noted in my journal on February 18th that I was four objectives behind my district

curriculum's pacing card which was a huge problem. I had to cover all the objectives on my pacing card in order for my students to be prepared for their CRT at the end of the year.

What took most of the time at the beginning of the study was explaining the process of descriptive feedback to my students. There were also a couple different forms to record their feedback comments and their reflection comments which took time passing out and explaining. Once the students were familiar with the forms, I then realized that they were providing their peer quality descriptive feedback. The students were just saying things like, "Good job!" or "Show your work!" and "Do the problem!" So then, I had to slow things down more during class to create an understanding of what *is* descriptive feedback. I spent a lot of time creating lists on the board that had comments specific to the skills the students needed to do on the problem to show understanding of the objective. I also had to spend a lot of time encouraging and assuring that the students were being descriptive on their feedback forms to their peer and not simply counting problems write or wrong.

I thought to be more efficient and effective was to incorporate more than one objective at a time during a feedback session. On April 9th I wrote in my journal, "Is there a way to have an assignment that covers a couple objectives and then have kids give feedback on that piece?" To me, this would then be similar to a review, and I can assign fewer reviews. Before a test, for example, the students can do one assignment where they give each other feedback on a cluster of objectives. Due to limited time, I was not able to implement this idea of compacting the curriculum so plan to try this technique next fall with my next math class.

Many of my notes in my journal are ideas, such as the one above, to be more efficient and effective while having the students give each other descriptive feedback. As with any new strategy, it is the modeling in the beginning that takes the most time in class that may take away from instruction. As the process goes on and the students gain more knowledge and practice however, incorporating descriptive feedback is a strategy that has positive effect to student achievement. I will take some of the comments I gained from students in the interviews, which was to verbalize the feedback and do more than one assignment at a time.

On April 1th, which is at the end of my study, I also wrote in my journal, "How do I get them all? There are still three kids who are not doing their homework and therefore not getting or receiving any feedback." To be the most effective, I will need to find ways to get 100% of my student involved in the feedback process. I was unable to find a strategy in this study, so it is a goal of mine for this next year.

CONCLUSIONS

From my findings, I believe having students receive quality descriptive feedback is beneficial for students reflecting on their learning process. However, there are two concerns a teacher should keep in mind when implementing descriptive feedback to ensure the process is efficient and effective. One is the students' abilities to identify the skills needed when doing a problem to give their peer quality descriptive feedback so they can learn the objective better. A couple of my students commented how if feedback was not correct or descriptive, it could have hindered their learning. The second concern is the students' willingness to simply do their class work and then participate in giving their peers quality feedback. I struggled with a couple students simply not doing it because they did not want to take the time. One student in particular wrote his feedback

to a peer like this, “I do not like showing my work so to figure out what you did wrong look in the book.”

The reason why descriptive feedback is so important for students is be because many of them do not have many opportunities to reflect on their learning. Having them do so this very challenging at first because finding *how* they solve a problem wrong is more difficult than just counting it wrong. After some practice and modeling, students became more comfortable and the anxiety of feedback turned into a good thing. More students started turning in more of their homework and they started showing more of their work on their assignments because they did not want to be left out of the feedback sessions. The students also went from stressing about giving feedback to begging for it when they did not receive any. They would ask, “When are we going to get feedback?” They looked forwarded to giving feedback, too. A few students commented how nice it was to see how other people solved problems. The descriptive feedback process also followed a great idea about assessments from Stiggins (2006). Assessments should be *for* student learning, not of student learning. When the students engaged themselves in descriptive feedback, they were reflecting on their learning and they did not view it as an evaluative process.

Since students need a lot of guidance to have the process of descriptive feedback became natural, I also learned they need a separate form to write down their feedback comments. This form helps them get into the routine of focusing on the skills their peer needs to correct and providing examples or explanations for an objective. The form would also enforce Marzano, Pickering, and Pollock’s (2001) findings that say how feedback needs to be corrective, timely, specific to criterion, and student involved.

Simply telling a student that their answer on a test is right or wrong actually has a negative effect on student achievement.

Finally, the most valuable piece of data I found was the positive community which developed in my classroom. This was not one of my focuses, but as I wrote on my last journal on April 23, “They really seem to like giving feedback and they are SO nice to each other!” Rodgers (2006) even concluded that the power of students’ description of their own learning was the central role to not only meet student needs, but to create a trust and community in the classroom. Having the students give each other descriptive feedback avoided making evaluative judgments on each other and it gave me more information to share with that student, their parents, and other teacher as well about how my students were learning. Descriptive feedback is not self-assessment, rather it is a reflection on what the students have learned and for each student to be aware of his or her own learning processes (Rodgers, 2006).

IMPLICATIONS

I learned from my surveys that there were still a handful of students who said they felt okay about giving and receiving feedback. I want my students to feel great about the process. I plan to collect more data about how they can feel better about giving and receiving feedback on their formative assessments. I want to see if the struggle of giving feedback is from a lack of understanding of the concepts, a language and vocabulary barrier, or a motivational and comfort level issue. There was also a girl who told me during an interview that giving feedback would be better at if they could verbalize the feedback to her peer instead of writing it down. I support the verbalizing, but in the end I will always have students will use a form to write their feedback comments to keep the accountability.

To be more efficient, I will spend a day or two at the beginning of the school year teaching students how to give a peer quality, descriptive feedback. Since I have done the process this year, I have a collection of student work to show my students next year some good, and not-so-good, examples. I also will plan my lessons to have a limited time for the feedback process so the hour is not consumed. Then when the time is up it will be time for the next objective.

I will continue having my students give each other descriptive feedback on their homework and other formative assessments for many years to come. Even though some students will not participate or not give correct feedback, I believe the process is too beneficial for student learning to be excluded from my schema. I will also continue to provide feedback myself to continue the dialog between me and my students and to model quality descriptive feedback. To be effective, my biggest focus will be ensuring that the students are providing their peer quality descriptive feedback. This will take much time to model and check, but as mentioned earlier, once the students get in the habit the process of descriptive feedback will become natural.

Descriptive feedback is a learning process that will teach me and my students reflect what they have learned, how they learned it, and where we will go from there. I want my students to view their learning process as a cycle and not an end after an assessment.

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Appendix A

Date _____ Name_____

Essential Outcome: _____

Explain how you used your own feedback to fix the problems you did not get correct the first time?

_____

_____

_____

How much has your feedback helped you? (Circle one)

A LOT SOMEWHAT NOT REALLY NOT AT ALL

Appendix B

Descriptive Feedback Name _____

Date _____

Objective:_____

Problem # _____ Feedback

_____

_____

_____from _____

Problem # _____ Feedback

_____

_____

_____from _____

Problem # _____ Feedback

_____

_____

_____from _____

Reflection: What do you think about the feedback you received? Has it helped you? Explain why or why not.

_____

_____

Appendix C

Journal: How have you used descriptive feedback to master the objectives for the essential outcome?

- Did you pass the outcome the first time you tried the problem (in class or on your homework)?
- Who gave you feedback after your first attempt?
- Did you pass the outcome on your second attempt?
- If no, how many attempts did it take?
- Did you receive feedback after each attempt?
- What kind of feedback did you receive? Provide specific examples.
- When you took the formal assessment (chapter test), did you pass the essential outcome on the first try?

Appendix D

Student Journal **Name _____**

You received descriptive feedback on your assignments prior to this test. Please answer the following questions.

1. Describe the feedback you received on your assignments that prepared you for this test.
2. Did the feedback help you learn/master the objectives? Explain why or why not.
3. What could make receiving descriptive feedback better for you?

You also gave descriptive feedback on your peers' assignments. Please answer the following questions.

1. Describe the feedback you gave on the assignments preparing for this test.
2. Did giving feedback help your learning process? If so, how? If not, why not?
3. What could make giving descriptive feedback better for you?

Appendix E

Essential Outcome_____ Date _____

Using Descriptive Feedback Survey

1. For the essential outcome, how many objectives were you not proficient?

none **a few** **many** **all**

2. How many of those objectives did you receive descriptive feedback?

none **a few** **many** **all**

3. How many of your objectives did you relearn and retest?

none **a few** **many** **all**

4. How many of those objectives did you use descriptive feedback to relearn?

none **a few** **many** **all**

5. For the objectives in which you received feedback for, what was the most number of times it took for you to relearn and retest to be proficient? _____ What was the lease number of times? _____

6. If you did not use descriptive feedback, please explain why:

_____

_____

Appendix F

Essential Outcome_____ Chapter _____

Using Descriptive Feedback Survey

Objective (Give the chapter and section as well as the name of the objective.)	**Did you meet the objective?** (*Yes or No)*	**Did you receive feedback?** (*Yes or No)*	**How many times did it take you to meet the objective?**	**Did you receive any feedback for this objective?** (*Yes or No)*	**Did you use the feedback you received to relearn this objective?** (*Yes or No)*

1. If you used descriptive feedback to help you learn and meet an objective, please explain how it helped you.

2. If you did not use descriptive feedback to help you, please explain why.

Appendix G

Descriptive Feedback Survey

Circle the best word that describes your feelings about descriptive feedback.
Then provide an answer or comment to each question carefully and honestly using complete sentences.

1. How much about descriptive feedback do you know?

A LOT **A LITTLE** **NOTHING**

Explain what you know about descriptive feedback: _____

_____

2. How do you feel about receiving descriptive feedback?

GREAT **OK** **NOT GOOD** **BAD**

Explain why:_____

_____

3. How do you feel about giving descriptive feedback to a peer?

GREAT **OK** **NOT GOOD** **BAD**

Explain why:_____

_____

4. When you are not proficient on an essential outcome, how often do you use the feedback you receive to relearn the objectives?

ALWAYS **SOMETIMES** **RARELY** **NEVER**

Explain why:_____

_____

5. Write down one example of the descriptive feedback you received for the last essential outcome that has helped you the most.

Appendix H

Objective List and Understanding for Essential Outcomes Interview

1. What is the essential outcome?
2. Can you explain what that means to you?
3. What knowledge, reasoning, and skill objectives do you think one needs to have mastered to be proficient on the essential outcome?
4. Can you explain why they need to know these objectives?

Appendix I

Date _____

Essential Outcome: Solving Proportions & Using Scale Models

What skills do you need to know to be successful on the following objective?

8.6 I can write and compare ratios.

Appendix J

Interview: How do the students feel about how their learning process has changed after using descriptive feedback?

1. Do you remember the number of objectives you were proficient or not proficient in for the last test?
2. Did you ever receive descriptive feedback for those objectives?
3. How did the feedback help you? Can you give me an example?
4. How do you feel your learning process has changed by using descriptive feedback? Has it helped or has it not made a difference at all?
5. Can you give me examples.
6. How can we do descriptive feedback differently in the classroom to be more helpful?

Appendix K

Date: Barry - Journal

RESEARCH QUESTIONS

1. How will descriptive feedback impact students' ability and understanding of reflecting on their learning processes?

INCIDENT 1:

INCIDENT 2:

- What did I learn this week that will inform my teaching and/or journaling next week?

2. What will happen to students' understanding of the essential outcomes if they had to define the knowledge, reasoning, and skills objectives needed to use for descriptive feedback?

INCIDENT 1:

INCIDENT 2:

- What went really well this week, related to my research question?

3. What will happen to the number of students who need to relearn and retest an essential outcome after they use descriptive feedback?

INCIDENT 1:

INCIDENT 2:

- What changes have I seen in my students this week?

TEACHING QUESTIONS

4. What does my teaching look like when I model descriptive feedback or implement descriptive feedback so the students use it effectively?

INCIDENT 1:

- What have I noticed that I need to do differently?
- What has been working/not working effectively?

OTHER COMMENTS:

Appendix L

Quality Feedback Rubric

	1	2	3	4
Identify a skill that was misunderstood for the objective. Give an example or explanation for correction.	Student was not able to identify a skill that was misunderstood or provide an example or explanation for correction.	Student was able to briefly identify a skill that was misunderstood or give a brief example or explanation for correction.	Student was able to identify the skill that was misunderstood, but not give an example or explanation for correction.	Student was able to identify all the skill that was misunderstood and give an example or explanation for correction

Appendix M

Course Objectives	Strand	Text Sect.	Min # Days	Initial Mastery	Final Mastery	Test Scores	Retest Scores
Students will be able to write variable equations and expressions.	ALG	7.1		No	Yes No		
Students will be able to simplify variable expressions.	ALG	7.2		No	Yes No		
Students will be able to solve additions and subtraction equations.	ALG	7.3	11	No	Yes No		
Students will be able to solve multiplication and division equations.	ALG	7.4		No	Yes No		
Students will be able to solve two-step equations.	ALG	7.5		No	Yes No		
Students will be able to write and evaluate function rules.	ALG	7.7		No	Yes No		
Students will be able to graph functions in a coordinate plane.	ALG	7.8		No	Yes No		
Students will be able to write and compare ratios.	COMP	8.1		No	Yes No		
Students will be able to use rates to compare two quantities with different units.	COMP	8.2		No	Yes No		
Students will be able to find the slope of a line.	ALG	8.3	10	No	Yes No		
Students will be able to solve proportions using equivalent ratios and algebra.	ALG	8.4		No	Yes No		
Students will be able to solve proportions using cross products.	COMP	8.5		No	Yes No		
Students will be able to use proportions with scale drawings.	COMP	8.6		No	Yes No		
Students will be able to find the percent of a number.	COMP	9.1		No	Yes No		
Students will be able to use proportions to solve percent problems.	COMP	9.2		No	Yes No		
Students will be able to write percents as decimals and decimals as percents.	NS	9.3	8	No	Yes No		
Students will be able to use percents to interpret and make circle graphs.	DAP	9.5		No	Yes No		
Students will be able to find discounts, markups, sales tax, and tips.	COMP	9.7		No	Yes No		
Students will be able to calculate simple interest.	COMP	9.8		No	Yes No		
END OF QUARTER THREE							
Students will be able to classify angles by their measures.	GEOM	10.1		No	Yes No		
Students will be able to identify types of angles and lines.	GEOM	10.2		No	Yes No		
Students will be able to classify triangles.	GEOM	10.3	8	No	Yes No		
Students will be able to classify quadrilaterals and other polygons.	GEOM	10.4		No	Yes No		
Students will be able to use properties of similar and congruent polygons.	GEOM	10.5		No	Yes No		
Students will be able to use similar triangles to find lengths indirectly.	GEOM	10.6		No	Yes No		
Students will be able to identify transformations and symmetry in figures.	GEOM	10.7		No	Yes No		
Students will be able to evaluate expressions involving square roots.	COMP	11.1		No	Yes No		
Students will be able to find the length of a side of a right triangle using the Pythagorean Theorem.	GEOM	11.3	10	No	Yes No		
Students will be able to find areas of parallelograms.	GEOM	11.4		No	Yes No		
Students will be able to find the areas of triangles and trapezoids.	GEOM	11.5		No	Yes No		
Students will be able to find the circumferences of circles.	GEOM	11.6		No	Yes No		
Students will be able to find the areas of circles.	GEOM	11.7		No	Yes No		
Students will be able to classify solids and identify their parts.	GEOM	12.1		No	Yes No		
Students will be able to sketch solids.	GEOM	12.2		No	Yes No		
Students will be able to find surface area of rectangular prisms.	GEOM	12.3		No	Yes No		
Students will be able to find surface area of cylinders.	GEOM	12.4	8	No	Yes No		
Students will be able to find volume of rectangular prisms.	GEOM	12.5		No	Yes No		
Students will be able to find volume of cylinders.	GEOM	12.6		No	Yes No		
END OF SEMESTER				**CRT SCORE**			

REVISED JUNE 2006