The Effects of Goal-Setting Conferences on Math Achievement

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Abstract

The purpose of this study was to examine the effect of goal-setting conferences on 5th grade math achievement. This study used a quasi-experimental design with a pre-test and a post-test. The study included 24 fifth-grade students from various ethnic backgrounds. Data regarding students' performance on the MAP Mathematics was collected, disseminated, and analyzed by the researcher. The study hypothesized that goal-setting conferences would have no effect on MAP Math achievement. The results indicated a significant difference between the mean data of the pre- and post-test data, thus rejecting the null hypothesis. The results of this study help to support research involving self-regulated learning and academic achievement. Recommendations for future research include using a larger sample size and increasing the length of the study.

CHAPTER I

INTRODUCTION

Motivation is critical to academic success. Motivation directs student behavior towards reaching academic goals. The presence of motivation affects learning and achievement. When students possess motivation and a growth mindset, they have an attitude towards schoolwork that says, "I care about my progress and level of achievement." Conversely, the unmotivated student says, "I don't care." It is critical that educators work to change the thinking of the unmotivated student, so those students can be successful in the academic setting and become positive contributors to society. Educators have the responsibility to identify settings, situations, and conditions that will offer students the opportunity for success and growth. This responsibility is at all levels of public education, including the primary level.

This is a cycle of failure in public education that educators can and should work to disrupt. Students can be unmotivated as early as the primary/intermediate years of elementary school. Often the unmotivated student eventually becomes so discouraged that he/she shuts down. These students are actually motivated to avoid schoolwork and may be averse to structured learning. Students may suffer from a feeling of powerlessness as it pertains to effectuating their educational outcomes. The academic environment plays a vital role in students' beliefs in his/her abilities. There is a substantial amount of research that supports the assumption that students' motivation benefits when teachers encourage them.

The average national graduation rate is 84%. The average Baltimore County Public School (BCPS) graduation rate is 89.16%. While that average seems relatively high, it indicates that one out of every ten students is dropping out, therefore, not graduating. A high school diploma is crucial for adult success.

The data associated with education is of great interest. If corporate America can have a "bottom line", education can as well. Each student adds to the overall system composite score and/or rate of graduation. Progress towards any goal begins with small steps. If each student has a "bottom line", a corporate approach to meeting that goal can be employed. Helping students meet their bottom line is like managing a sales force and motivating them to achieve their goals. Teachers are asked to collect and analyze data all the time. The data is discussed among peers and administrators. When is the data presented to students other than through an online gradebook or report card? Students need to be part of the process, not just passive receivers. The expression, "if you aim at nothing, you will hit it every time", applies to the classroom. While some students have an end goal, many students are just going through the daily grind with no specific goal in mind. This is especially harmful for the unmotivated student.

Statement of the Problem

The purpose of this study was to examine the effectiveness of goal-setting conferences with 5th grade students on increasing their level of math achievement on the MAP Mathematics test.

Hypothesis

Null Hypothesis

The goal-setting conferences with 5th grade students will have no effect on Mathematics achievement.

Operational Definitions

The dependent variable is math achievement measured with MAP. The score provides status and growth norms for individual students. The RIT score measures the value of a student's score in

relation to his/her previous scores. Student responses throughout the MAP test are used to produce the final RIT score for that student.

Goal-setting conference is the independent variable. Conferences with individual students were administered prior to the MAP test, several times leading up to MAP, at the conclusion of MAP, and a final follow-up.

CHAPTER II
REVIEW OF THE LITERATURE

The literature review examines how self-regulated learning (SRL) and student motivation affect achievement on the 5th Grade MAP Math Assessment. The first section discusses what self-regulated learning is along with the components of self-regulated learning. The second section examines motivation along with its social-cognitive and emotional aspects. Additionally, this section discusses measuring motivation. The third section investigates feedback. This includes the meaning and power of feedback, the cyclical nature of feedback, and calibration.

Self-Regulated Learning

When examining self-regulated learning instruction (SRL) as it pertains to fifth-grade students, it is important to know what SRL is and its components. Pintrich (2000) defines SRL as "an active, constructive process whereby learners set goals for their learning and their attempt to monitor, regulate, and control their cognition, motivation, and behavior". Pintrich goes on to emphasize that the individual student must be in control versus being controlled by a parent or a teacher. He creates an analogy in that he compares self-regulated learning to controlling a thermostat. The student sets the "temperature" and then does what is needed to maintain the pre-set temperature, adjusting as needed.

Zimmerman (1989) provides a comprehensive definition of the characteristics of self-regulated learning. He describes self-regulated learners as individuals who possess the metacognitive motivation and active behaviors in pursuit of their learning. Zimmerman, Bonner and Kovach (1996) provide the framework for aspects included in the SRL process. The framework sets forth that self-evaluation/monitoring, goal setting/strategic planning, strategy monitoring, and outcome monitoring are interrelated in the SRL cycle. A relationship exists

among self-regulated learners and their attitude and achievement as it relates to mathematics (Arsal, 2009).

Kistner et al. (2010) investigates how teachers can promote self-regulated learning through the employment of either direct or indirect methods. Teachers can provide direct SRL instruction or provide a learning environment that indirectly promotes SRL. This study revealed that much of SRL strategy instruction is taught implicitly as opposed to explicitly, which he found to be rare. However, explicit strategy instruction was associated with academic gains which highlighted a discrepancy between the usefulness of explicitly delivering SRL instruction and its seldom use/application within the classroom.

According to Zimmerman and Schunk (2001), SRL goes along with higher academic performance; therefore, teachers should foster and promote students' self-regulated learning behaviors (Waetens et al. 2002). Bell et al. (2014) explains that contemporary views of mathematics education now include a call to teach both content and processes. Due to technological strides and globalization, pressure has been applied to public education to move students away from memorization and recapitulation and move towards a standards-based education. This study explains that teachers support self-regulated learning by incorporating the processes and practices that are part of standards-based mathematics instruction. Self-regulated learning is cyclical in nature and one component leads to the next.

The study conducted by Bell et al. (2014) includes the creation and use of a strategy observation tool. The intent of the strategy observation tool was to promote students' connections between their learning actions, the teachers' assessment of their performance, and the students' ability to judge how well they would perform on an assessment. This tool connects the three phases of self-regulation which are: forethought, performance, and self-reflection

(Zimmerman, 2000). Forethought occurs prior to a learning task. In this phase, students analyze the assigned task and create a plan in which they determine the necessary steps needed to accomplish the task. It is in this stage that students set goals for their learning. Next, students "perform" the task, by studying or completing a set of math problems. While in this stage, students are self-monitoring their progress in understanding the task. After time on task, students then assess their progress as they consider how well they are accomplishing their set goal (self-reflection). This cycle continues as self-reflection then continues back around to forethought.

Motivation

Motivation is a background variable that is interrelated with self-regulated learning and mathematics achievement. It is a sub-component of SRL. Cho and Heron (2015) examines the role of self-regulated learning, specifically as it is related to students' motivation, emotion, and learning strategies in an online, remedial math course. The study viewed student experiences in three aspects that included achievement, course satisfaction, and passing/not passing. This study examined the contrast between the motivation variables of self-efficacy and task value versus boredom and frustration.

Cleary (2006) and Cleary and Chen (2009) conducted a study that investigated the level of motivation as it related to task interest and instrument reliability. These studies showed that both variables distinguished high achievers from low achievers. A high achiever will inherently have more intrinsic motivation compared to the low achiever. The study determined that task interest is a stronger predictor of students employing self-regulated learning strategies. Motivational beliefs or self-efficacy, which Bandura (1997) defines as a person's belief in his or her ability to succeed in specific situations or satisfactorily complete a task, is a very significant predictor of academic achievement and learning behaviors as studied by Clearly and Kitsantas

(2017). Their study examines motivational beliefs and regulatory behaviors. They examined SRL through a social-cognitive lens as they examined motivational beliefs as a predictor of SRL behaviors. They gathered data about student motivation directly from the students and used teacher ratings to gather information about student SRL behaviors.

Emotions play a role in SRL and motivation/self-efficacy. Pekrun et al. (2010) found that self-regulated learners demonstrate positive emotions. These include hope, enjoyment, and pride in learning. Self-regulated learners display control of their negative emotions. They manage anger, anxiety, boredom, and frustration. Pekrun noted that negative emotions negatively relate to intrinsic motivation, effort, attention, and academic achievement. Star et al. (2014) studied the drop in motivation of middle school math students. They directed their study to examine if different types of technologies could be designed to leverage self-efficacy, engagement, task interest, and stamina. Star and his team studied the roles of self-efficacy, implicit theories of ability, and value beliefs as they relate to students' pursuit of STEM interests. Their study highlighted groups that demonstrate a lack of self-efficacy due to emotional constraints and environmental factors. Women and racial/ethnic minorities' underrepresentation in STEM careers can be attributed to those groups' source of self-efficacy. Their study indicated the presence of some evidence to indicate that engagement with innovative academic technologies can positively impact self-efficacy.

Personal achievement aligned with goal orientation along with self-efficacy and utility have all been positively associated with achievement outcomes, Gilbert et al. (2013). This group of researchers used several instruments to measure motivation/self-efficacy. These included surveys and assessments related to classroom environment, teacher expectations/support, reform practices, student motivation and achievement, and student achievement goals.

Feedback

How often are students asked to partake in a variety of reform-oriented activities in the classroom? This indicator is one of measurement instruments designed by Gilbert et al. (2013). Reform-oriented activities are an integral part of feedback. Feedback is one of the most critical components of teaching and learning according to Hattie & Timperley (2007). According to Hattie and Timperley, the impact of feedback can be either positive or negative. Their study examined the meaning of feedback. According to the researchers, feedback is information provided by an agent (teacher, parent, self) regarding one's performance or understanding. They state that feedback is a consequence of performance. Feedback has a purpose and an effect and there are several types of feedback. An educational continuum exists with instruction at one end and feedback at the other. They state that feedback has no effect if presented in a vacuum. Rather, effective feedback is powerful when it is given within a learning context. Effective feedback provides cues or reinforcement rather than praise or punishment. Feedback is most effective when specific and challenging goals are presented. Three questions are part of the feedback process:

1) Where Am I Going?
2) How Am I Going?
3) Where to Next?

These questions work together as opposed to working in isolation. How am I going? leads to Where to next? The goal of feedback is to close the gap between the first and last question. It is cyclical in nature. Feedback is important to self-regulated learners. Feedback is a catalyst for effective self-regulated learners as they generate internal feedback and develop/employ cognitive routines while they are engaged in academic activities. It is part of the monitoring process that self-regulated learners employ.

Feedback includes a calibration of before-task and post-task. This is referred to prediction and self-evaluation in the study conducted by Labuhn et al. (2010). This study indicates that a vast majority of students lack the ability to correctly estimate their performance. It indicates that many students overestimate or are overconfident about their capabilities. Feedback provided by an agent or other external source can help the calibration process. Daily feedback can improve calibration which is a critical component of self-regulated learning. While this doesn't inform students how to self-regulate, it starts the process. These processes should positively impact student achievement over the long term. However, no type of external feedback will have an effect learner behavior/performance unless the learner is able to interpret and process the feedback.

Summary

This review of the literature has discussed self-regulated learning along with its related components of motivation and feedback. The literature provided definitions and parameters for which to examine self-regulated learning and the types of students who are self-regulated learners. Teachers can employ either explicit or implicit strategies as it relates to self-regulated learning instruction. Teachers have the task of incorporating these strategies into their instruction to promote self-regulation and to help students grow these skills. The review of the literature indicates a strong relationship between the ability to self-regulate learning and math achievement as well as improved academic achievement in all content areas.

CHAPTER III

METHODS

The purpose of this study was to examine the effectiveness of goal-setting/conferencing with 5th grade students on the Measurement of Academic Progress (MAP) Mathematics Test. Goal setting was administered using the MAP Student Goal Setting Worksheet.

Design

This study was based on a quasi-experimental pretest-posttest design using a non-probability, purposive, convenient sample. A pre-test was administered using the MAP Winter 2018 assessment to determine the Rasch Unit (RIT) score of each student receiving the treatment. Students were administered treatment through 1:1 conferencing in which prior scores were examined, areas of weakness identified and a goal for the Winter 2019 Assessment was set. After the treatment was administered, all the students' MAP scores were reassessed to see if their MAP Math scores had improved.

Participants

The participants in the study were a non-probability, purposive, convenient sample. The sample consisted of 24 fifth grade students at a public school in Reisterstown, Maryland. The selected elementary school's population has a student body that is culturally and socio-economically diverse. Many students are from English as a Second Language (ESL) families. The sample consisted of 14 females and 10 males, ages ten and eleven. Of the students, two were identified as ESL students. The sample consisted of four Caucasian students, thirteen African-American students, five Hispanic students, and two students from other ethnicities. In this

sample, there was no further delineation beyond students being placed in an on-grade-level mathematics class; as opposed to being labelled as advanced-level students.

Instruments

The Measurement of Academic Progress for math addresses overall RIT scores with scores derived from goal performance in the areas of Operations and Algebraic Thinking, and Number and Operations. The MAP math score measures goal performance in the above-mentioned areas within each RIT band. The specific RIT score represents the level where a student is ready to learn. MAP Growth Reports provide specific learning statements that are directly aligned to Maryland State Standards.

MAP was reviewed for validity and reliability. In the Buros Mental Measurement Yearbook, Cizek and Gierl (2016), reviewed MAP. The reviewers state that MAP is reliable in that 3 types of reliability are reported and include marginal reliability that has a high coefficient, conditional standards of errors of measurement are reported in RIT units, and test-test reliability is applied. Both agree that MAP efficiency is high and users can count on MAP scores to be reliable. The reviewers agree that MAP is valid, however, the second reviewer, Alves (2016), stated the validity is somewhat limited due to the exclusion of science not being tested.

Procedure

The MAP Math Winter 2018 which served as the pre-test was administered to all fifth-grade students. Students' RIT scores were compared to their classmates and the students with an achievable growth projection were selected to receive the treatment. The growth projection is based on the student's grade, their initial RIT score, and the subject area being tested. The pre-set

growth projection represents the median level of growth observed in similar students from MAP's norming sample.

Based on the results, twelve students from the morning class and twelve students from the afternoon class were selected to receive the treatment. Students participated in a conference with the teacher where they were presented with their MAP Student Goal Setting Worksheet. The conference consisted of reviewing their Winter 2018 data which included the percentile rank, the overall RIT score, the goal performance data for each sub-category, the projected RIT growth, and a student action plan. The discussion centered on prior score, projected RIT, the student goal and an action plan to improve the weakest of the goal performance sub-categories. Students were assigned tasks within DreamBox, which is an online math software program tailored to meet specific student needs to reinforce areas of need as identified in the goal performance sub-categories. Teacher-student conferences continued twice weekly as students worked on DreamBox and encountered tasks in which the students required assistance.

On the day of the assessment, students in the treatment group received their Student Goal Setting Worksheet. They were reminded of their goal and at the conclusion of the assessment, the students recorded their Overall RIT score and conferenced with the teacher to discuss their MAP results and goal performance.

CHAPTER IV

RESULTS

The null hypothesis stated that goal-setting conferences with 5th grade students would have no effect on Mathematics achievement. Analyses showed a mean pretest score of 208.13 which significantly increased to 219.38 on the posttest, $t(23) = -8.56$, $p<.05$.

Table 1: Subject Group RIT Score Performance on Pre/Post MAP (All Students)

	Mean	N
Pre-test	208.13	24
Post-test	219.38	24

In Table 2 the analyses showed a mean pretest score of 208.06 which considerably increased to 222.75 on the posttest for students who did make their projected RIT score with $t(15) = -13.515$, $p<.05$.

Table 2
Subject Group RIT Score Performance on Pre/Post MAP (Students Making Projected RIT)

	Mean	N	Std. Deviation
Pre-test	208.0625	16	9.71232
Post-test	222.7500	16	11.09655

Below, Table 3 illustrates the means and standard deviations of student RIT scores on the MAP pretest and posttest looking specifically at the students who did not meet their projected growth score. Pre-test mean was 208.25 with a standard deviation of 11.89 which appreciably increased to a mean of 212.63 with a standard deviation of 12.28 $t(7)= -3.24$, $p<.05$.

Table 3

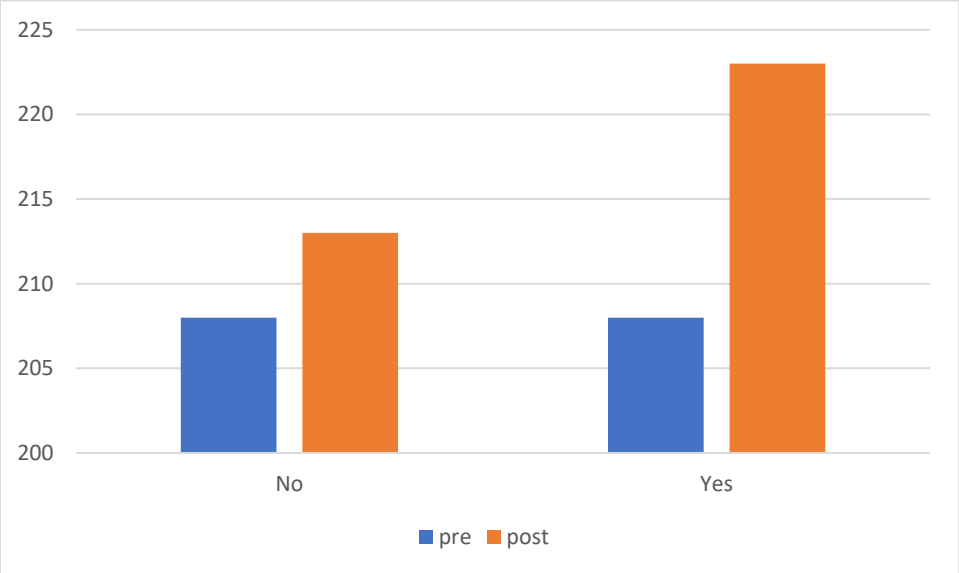
Subject Group RIT Score Performance on Pre/Post MAP (Students Not Making Projected RIT)

	Mean	N
Pre-test	208.2500	8
Post-test	212.6250	8

Figure 1 provides a visual representation of a comparison between the 16 students who met their Projected RIT Score and the 8 students who did not meet their Projected RIT Score. There was no significant difference in the pre-test scores between the non-achievers (M=208.25) and students who met the projected score (M=208.13). However, there was a significant difference in the post-test scores for non-achievers (M=212.63) versus achievers (M=222.75)

Figure 1

Student Results in Meeting Projected RIT Score



The graph also illustrates that the students who did not achieve the projected RIT score still had a significant difference in their pretest versus posttest results as shown in Table 6.

Most students met or exceeded their projected RIT Score and even those students who did not, many of them made good progress. Hence, the null hypothesis that goal-setting conferences with 5th grade students will have no effect on Mathematics achievement was rejected.

CHAPTER V

DISCUSSION

The null hypothesis stated that goal-setting conferences with 5th grade students will have no effect on Mathematics achievement was rejected. There was significant change in the RIT scores. The null hypothesis was rejected when the majority of the sample, 16 out of 24, met or exceeded their projected RIT score on MAP Mathematics.

Implications of Results

In this experiment, there was a significant effect on RIT scores on many of the students who received the goal-setting conferences. The results showed that there was no significant difference between the mean of the pretest scores for the students who met projection versus those who did not. However, there was a significant difference in the posttest RIT scores for both groups, those meeting their projected score and those who did not. Despite not everyone meeting the projected score, there was significant growth from pretest to posttest. The hypothesis that goal-setting conferences with 5th grade students will have no effect on Mathematics achievement was rejected. The use and application of goal-setting conferences appeared to affect an increase in scores. Achievement improved for nearly all the students. Since the results showed that goal-setting conferencing with students played a role in improving their RIT scores, students may achieve at a higher level when presented with a goal.

Theoretical Consequences

A significant impact of employing goal-setting conferences as a part of student-regulated learning was found to have a significant impact on this study. Theorists such as Bandura (1986) believe that self-efficacy is a key component that affects self-regulated learning. Zimmerman's (2000) model of self-regulated learning consists of three phases: forethought, performance, and

self-reflection. The researcher and student participating in this study applied that model of behaviors and the results of this study supported that theory.

Threats to Validity

This experiment had several threats to validity that might have affected the results. First, the amount of time students spent on DreamBox might have helped to increase their scores. DreamBox is an online software provider that focuses on mathematics education and practice. Students participating in this experiment received targeted DreamBox instruction as needs were identified as part of their pre-test scores and initial conference. DreamBox offers personalized lessons intended to close math gaps. Time and lessons completed on DreamBox was not reflected in the analysis.

The second threat to validity was the level of or lack of motivation on the part of the participants. It is difficult to quantify the level of motivation present in each of the participants. It could be a falsehood to assume that just because a goal score was introduced, students would automatically work harder to achieve. As the researcher of this study, the researcher set the goal, not the student.

A third threat to validity involves the type of sample used during this experiment. Since a convenient sample was used, the sample might have leaned toward a more homogenous ability level on the part of the students. The sample was small, only 24 participants. The study might have produced different results if the treatment were applied to the entire grade level, therefore reducing the impact of a single instructor with a small sample.

Similar Research

Components of this experiment are very similar to the study performed in 2009 by Arsal. Arsal examined the impact of self-regulation instruction on math achievement. His findings

indicated that self-regulated learning (SRL) increased both math achievement and improved subject attitude. His study was similar in that planning, monitoring, and goal-setting was implemented. Additionally, his research design was based on a pretest and posttest model.

The significant increase in achievement can be supported by research performed by Kistner et al. (2010). Their research found that explicit strategy instruction is associated with gains in math achievement and the promotion of SRL is important for academic achievement.

Bell and Pape's (2014) experiment involved scaffolding the development of self-regulated learning in math classrooms. Their study involved coaching the students to self-observe their learning strategies and make connections between those strategies and math outcomes. Students were taught to set goals and to select strategies that would help them achieve those goals. Bell and Paper used Cleary and Zimmerman's 2004 study in which the researchers reported that this type of intervention supported the development of SRL behaviors. Teachers can engage their students in the processes of SRL to help advance student achievement.

Implications for Future Research

Results from this study showed that the focus of instruction is not the sole role of the educator. Instruction should expand beyond content to include self-regulated learning strategies to support students' development and application of learning behaviors. Students need guided practice in learning behaviors not just content.

Future research would benefit from extending the time of the study to be several months or even an entire academic year. Applying the treatment to all students, not just a select group would provide a deeper breadth of data.

Additionally, a deeper exposure to SRL strategies and guided practice with those strategies compared with test results could provide a basis for a paradigm shift in classroom education.

Conclusion

This study provided significant statistical evidence that goal-setting conferences led to increased student MAP Math RIT scores. Although the results were separated into two groups, those achieving their projected RIT score and those who did not, both groups demonstrated a significant growth in their overall MAP Math RIT scores.

This research paper provided a thorough picture, description, and analysis of the outcomes associated with this study of the students who met their Projected RIT Score, and those who did not meet their Projected RIT Score. Further evidence-based research is required to further study if the higher scores were a result of goal-setting conferences and self-regulated learning.

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