Investigating the Impact of Extrinsic Rewards on Intermediate Tier III Math Competency

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Abstract

Teachers are faced with increasing amounts of pressure to improve academic achievement in their classrooms. Educators often turn to incentives to motivate students to perform to their highest abilities on achievement tests. The purpose of this action research project was to examine the impact extrinsic rewards had on fourth and fifth grade Tier III math students' performances on weekly achievement assessments. For this action research project, four fourth grade students and four fifth grade students, identified as performing well-below their peer group in the area of math computation based on results from school-wide screenings, were chosen to participate in this study. Participants were assessed weekly to measure progress towards their Tier III math goals. For two weeks, participants were assessed under non-reward conditions. Then, students were offered tokens for increasing their weekly scores and assessed for two weeks under reward conditions. Data was collected and analyzed to compare student growth between the non-reward and reward conditions. Overall findings suggest that rewards did not make a signficant impact on individual student performance. A closer examination of the data indicated that there was no signficiant difference in student progress based on gender. The data did, however, indicate that the fourth grade participants performed better under reward conditions than non-reward conditions while the fifth grade participants performed better during non-reward conditions than reward conditions.

Investigating the impact of extrinsic rewards on intermediate Tier III Math competency

Schools across America are feeling a great deal of pressure to ensure all students succeed. A large number of these schools have adopted the Common Core State Standards Initiative (2010) and as a result, are shifting the focus of public education to prepare students adequately for college or the workforce. In order to ensure that all students experience success in today's schools, teachers need to elicit and guide students' motivation.

Teachers evaluate children's cognitive performance on a daily basis at school. Children are often given incentives to perform to their maximum ability in a variety of academic situations. Effective incentives are powerful tools in the field of education. Understanding how children react to various motivations can guide teachers in structuring classroom and testing environments in order to maximize student performance (Worthy, Brez, Markman & Maddox, 2011). Motivation is a complex concept involving both intrinsic and extrinsic variables.

Intrinsic motivation

Behavior that is *intrinsically motivated* is valued for its own significance, not for a reward (Deci & Ryan, 1985; Rassuli, 2012). An intrinsically motivated student studies a topic because he or she has a strong desire to learn the subject matter and satisfy his or her natural curiosity. In order for an action to be intrinsically motivated, an individual must feel free from external pressures and external control. This freedom from external control, and in turn, the experience of being in, or perceiving that one is in, control of one's own environment or outcomes is self-determination (Deci & Ryan, 1985). A person reading a book for the pure enjoyment of reading the book is intrinsically motivated. An intrinsically motivated individual experiences interest and enjoyment, feels competent, and, in some instances, experiences flow (Deci & Ryan, 1985; Csikszentmihalyi, 1990).

Flow

Flow is an experience in which an individual is completely immersed in the experience so that action and awareness merge and the individual is intensely concentrating on the task at hand so much so, that he or she experiences a loss of self-consciousness and transformation of time (Czikszentmihalyi, 1990). Flow is an autotelic experience, one that is a self-contained activity, engaged in simply because the participation in the activity itself is the reward. Flow is not an exotelic experience, or one that is engaged in for external reason or expectation of a future benefit (Czikszentmihalyi, 1990). The experience of flow is a delicate balance between perceived action capacities and perceived action opportunities (Czikszentmihalyi, 1990). If challenges begin to exceed skills, one might become anxious. If skills exceed challenges, one might become bored (Czikszentmihalyi, 1990). An illustration of this experience might be a pianist, deeply consumed in playing a piece of music, unaware of his surroundings and time passing, focusing only on playing the piece of music. This pianist is experiencing flow, an intrinsically motivated experience that is just challenging enough to keep his interest, but not so challenging that he becomes frustrated. This pianist experiences flow because he is at an appropriate level of challenge.

Zone of Proximal Development

There is a relationship between skill and performance that is crucial for learning to occur. The *Zone of Proximal Development* (ZPD) is the range of difficulty of tasks that are too hard for an individual to complete independently, but can be completed with assistance from a more skilled-individual (Louis, 2009). Cognitive development will only occur when an individual is confronted with a task within his or her ZPD (Louis, 2009). A child asked to read and answer questions about a text that is well-above his reading level is not likely to be able to complete the task and as a result, will gain little to nothing from the lesson. However, if a teacher carefully selects a text that the child is able to read with some assistance from the teacher or a stronger reader (that is, a text within the child's ZPD), the child is more likely to be successful and learn from the activity. In an educational setting, it is crucial to consider a child's ZPD when planning for instruction, but just because a task is within a child's ZPD does not necessarily mean he or she will be intrinsically motivated to learn it. In the absence of intrinsic motivation, educators must seek other means by which to motivate students to learn.

The Relationship between Extrinsic Motivation and Intrinsic Motivation

Behavior that is *extrinsically motivated* occurs to acquire rewards other than the inherent interest in learning (Rassuli, 2012). An extrinsically motivated student participates in an academic activity because it may help them to get a good grade, satisfy teacher requirements or gain recognition from their peers or parents (Law, 2008). An extrinsically motivated person might study for a test simply to earn a good grade, not necessarily because he is interested in learning the material.

Based on the historical theoretical constructs such of *Self-Determination Theory* (Deci & Ryan, 1985) and the theory of flow (Czikszentmihalyi, 1990), optimal learning experiences and development occur in the absence of external rewards. Extrinsic rewards may distract the learner from achieving the ultimate goal of learning (Rassuli, 2012). Additionally, extrinsic rewards can undermine self-determination, weaken interest and diminish natural curiosity (Deci & Ryan, 1985; Rassuli, 2012). Stated differently, this means that the use of extrinsic rewards can be detrimental to intrinsic motivation.

The relationship between intrinsic motivation and extrinsic motivation is regarded within the self-determination theory. Internalization is the natural process in which individuals attempt to transform social requests into personally endorsed values and self-regulations (Deci & Ryan, 2000). This is the means through which an individual assimilates and reconstitutes former external regulations so that he or she can be self-determined while enacting said regulations (Deci & Ryan, 2000). For example, a person who runs regularly might have started the habit because he was seeking weight loss (an extrinsic motivator). Over time, this person might accept running as beneficial to himself, learn to enjoy it for the act that it is and make it a valuable part of his life so that this formally extrinsically motivated activity is now intrinsically motivated. When the process of internalization is functioning ideally, an individual will identify with the importance of social regulations and fully accept these regulations as his or her own, referred to as integration (Deci & Ryan, 2000). If integration is not completed, regulations and values may either remain external or be only partially internalized, resulting in one of three unintegrated identifications (Deci & Ryan, 2000; Poulsen, Rodger & Ziviani, 2006).

The first of these identifications is external regulation. External regulation occurs when behavior is controlled by specific external contingencies such as tangible rewards or threat of punishment (Deci & Ryan, 2000; Poulsen et al., 2006). A child completing a homework assignment to avoid missing recess time is demonstrating behavior that is controlled by external regulations.

The second unintegrated identification is introjected regulation. Introjected regulation is similar to external regulation in that an individual's behavior is the result of contingent consequences. However, within introjected regulation, the contingencies are administered by the individual to themselves, such as pride or threats of shame (Deci & Ryan, 2000; Poulsen et al., 2006).

The third and final unintegrated identification is identified regulation. Identified regulation occurs when an individual recognizes and accepts the underlying value of a specific behavior and engages in it without the need for bribes or threats, even if the activity itself is not particularly pleasant for the individual (Deci & Ryan, 2000; Poulsen et al., 2006). In the school setting, a student might experience identified regulation if he or she rehearses math facts nightly, not because he or she enjoys it, but because he or she understands and accepts that in order to improve at math, one must be able to recall the basic facts. Understanding these theoretical frameworks of motivation, can positively impact students' learning.

Motivating Students to Learn

Current practices suggest that student's intrinsic motivation for learning does not have to be innate, and in fact, under proper provision, extrinsic rewards may actually enhance intrinsic motivation for learning (Law, 2008; Rassuli, 2012). In the educational setting, this appears as a child is offered bonus points for reading a specific number of books in a quarter. The child, indifferent to reading at first, is extrinsically motivated to read more often. Through this process, the child learns to enjoy reading and as a result becomes intrinsically motivated to continue reading even after the quarter is complete. When accompanied by a degree of autonomy, extrinsic motivation is likely to result in greater engagement and higher-quality learning. In such situations, extrinsic motivation may be just part of a continuum of motivation and could lead to other types of motivation, including intrinsic motivation (Law, 2008). Individuals move along the continuum of intrinsic and extrinsic motivation depending on the task at hand and the individuals' incentives to learn (Rassuli, 2012). In order to align extrinsic rewards with intrinsic motivation, a clear distinction must be made between intrinsic goal framing and the use of extrinsic rewards. Extrinsic rewards must be perceived as being autonomy-supportive rather than controlling. Teachers must create interest in classroom activities to support self-motivation in students (Rassuli, 2012). An example of a teaching method that meets the criteria for aligning extrinsic rewards with intrinsic motivation would allow a student choice in an assignment that is highly relevant to his life or interests in addition to the offered extrinsic reward.

In an academic setting, specifically elementary schools, students must perform a task or series of tasks in order to receive an extrinsic reward (Fawson, Reutzel, Read, Smith & Moore, 2009). The incentive path is the path students must navigate in order to receive a reward (Fawson et al., 2009). An incentive path might be a set number of timed math fact assessments a student must pass before earning a reward. As part of navigating the incentive path, a student has a goal or target he or she is trying to make in order to receive a reward.

Goal-setting is defined as the process of establishing clear and workable targets or objectives for learning (Moeller, Theiler & Wu, 2012) and is a key characteristic of flow (Paulsen et al., 2006). Student approaches to completing a task may include approach goals or avoidance goals (Worthy et al., 2011). Approach goals are situations in which a student is working toward a desirable end state. In contrast, avoidance goals are a situation where an individual is trying to prevent an undesirable end state (Worthy et al., 2011). When pursuing a goal, an individual develops a psychological state of readiness or focus (Worthy et al., 2011). An individual in a promotion focus is working toward positive end states, while an individual in a prevention focus is working to avoid negative end states (Worthy et al., 2011). The promotion and prevention foci and the approach and avoidance goals are related in that it is possible for two people to share an approach goal but not a focus. For example, two people may share an approach goal of earning a prize. One person may pursue the goal in a promotion manner in order to gain a prize, while the other person may pursue the goal in a prevention manner to avoid losing a prize (Worthy et al., 2011). Research indicates children perform better in a promotion focus than in a prevention focus; students in a prevention focus experienced more anxiety than peers who were in a promotion focus (Worthy et al., 2011).

The purpose of the current study is to examine the relationship between extrinsic rewards and intermediate students' achievement towards their Tier III math goals. Tier III math goals are the target number of points a student must achieve on a curriculum-based measure (CBM) in order to demonstrate proficiency and be considered for advancement in the response to intervention (RTI) process. Tier III math goals were selected because student progress towards these goals is measured weekly using a CBM and the goals are clear to the students (an important characteristic of flow) (Czikszentmihalyi, 1990). Additionally, while partially speculative, it is the teacher-researcher's professional opinion that the students might not be performing to their full potential on the weekly CBM.

Past research has been conducted examining the relationship between extrinsic motivation and student performance at the collegiate (Rassuili, 2012), high school (Eisenkopf, 2011; Emmett& McGee, 2013), and middle school level (Paige, 2011) using bonus points (Rassuili, 2012), grades (Paige, 2011), recognition (Emmett & McGee, 2013; Paige, 2011), special privileges (Emmett & McGee, 2013) and monetary rewards (Eisenkopf, 2011) as extrinsic motivators and has yielded conflicting results. Some researchers found the use of a bonus point system, grades, student recognition and special privileges (such as an express lunch pass and participation in school dances) improved overall student performance on academic tasks (Emmett & McGee, 2013; Paige, 2011; Rassuili, 2012). The use of monetary rewards, however, was found to only increase students' time spent on a given task, not student performance (Rassuili, 2012). Although this research provides insight into possible extrinsic rewards that might be used to motivate students to achieve, these studies were conducted on older students. The current study examines the impact of extrinsic rewards on intermediate students' performance. It is possible that some of the extrinsic rewards offered in the abovementioned studies could motivate younger students, the current research study will utilize more age-appropriate rewards as extrinsic motivators.

Extrinsic Rewards and Reading

Previous research conducted at the elementary level has examined the impact extrinsic rewards have on student achievement in reading. This research has found that students who read for extrinsic benefits (recognition, grades, competition and social reasons) perform at a lower level on reading comprehension measures than their peers (Law, 2008), however, other research suggests that implementing interdependent group-oriented rewards in conjunction with an *Accelerated Reader*™ program might enhance the likelihood of struggling readers to choose to read (Pappas, Skinner & Skinner, 2012). This past research in reading is relevant to the current study, not only because the age range of the samples are similar, but because the sample in the current study has been identified as performing well-below average in comparison with their grade-level peers in the area of math computation. While previous research has indicated that extrinsic motivators might not positively impact overall student performance in reading (Law, 2008; Pappas et al., 2012), extrinsic motivators can positively impact the performance of struggling readers (Pappas et al., 2012). If extrinsic motivators can have a positive impact on struggling readers, perhaps extrinsic motivators can have a positive impact on struggling mathematics students as well.

Extrinsic Rewards and Mathematics

Research into the effect extrinsic rewards have on elementary student performance in mathematics is rather limited. A study conducted among fourth and fifth grade math students found that offering extrinsic rewards (in the form of bonus points) increased overall student accuracy and completion rates on a timed (10-minute) math computation assessment (Oliver & Williams, 2006). Once the reward contingencies were removed, the effects did not last and overall student accuracy and completion rate declined (Oliver & Williams, 2006). Interestingly, when the sample was broken down into high-performers, medium-performers and low-performers, it was discovered that the low-performers' completion rate increased in the follow-up assessment where the reward contingencies were removed (Oliver & Williams, 2006).

With prior research suggesting that extrinsic rewards may positively impact the achievement of struggling students (Oliver & Williams, 2006; Pappas et al., 2012), the current study examines the relationship between extrinsic rewards and the achievement of students who have been identified as performing well-below their peer group in the area of math computation. Previous research has examined the impact of extrinsic rewards on overall student performance in different academic areas including reading and mathematics, yet research has not examined the impact of extrinsic rewards on students currently receiving Tier III leveled interventions in the area of math computation. Understanding the relationship between external regulations and student performance could assist teachers in motivating their struggling students to achieve their Tier III goals, and in turn, experience success.

Method

The following section details the employed methodology for the current study. Mixed-methods action research was utilized to examine the relationship between extrinsic rewards and Tier III intermediate math students' achievement . The methods used in this research are consistent with the theoretical approach.

Location

The study took place in a rural intermediate school in central Illinois with a building population of 193 students (43.5% low income). The school serves two communities and has nine classrooms ranging from third to fifth grade. The demographics of the school include 94.8% White, 2.6% Black, 0.5% American Indian and 2.1% Multi Racial/Ethnicity. Currently, 46% of the student population qualify for free or reduced lunch.

Participants

Participants in this study were selected because they receive Tier III leveled math interventions, as identified prior to this study by a school-wide universal screener. Participants in this study included four fourth grade students (three female, one male) and four fifth grade students (two female, two male). All students receiving Tier III leveled math interventions were involved in this study. Participants were assigned an identifying number to ensure confidentiality. For the purpose of distinguishing between fourth graders and fifth graders, as well as to identify gender, the participants were assigned a code number to ensure confidentiality. The first number in the code represents the grade level of the participant. The letter in the middle of the code represents female or male. The following participants were involved in this study: 4F1, 4F2, 4F3, 4M1, 5F1, 5F2, 5M1, 5M2.

One participant (5M1) has a documented learning disability in reading. Specifically, 5M1 has an identified learning disability in reading fluency. He receives core reading instruction in the general education classroom and support for reading fluency from the special education teacher.

Measures

The study used the curriculum-based measure M-COMP from AIMSweb™ (Pearson, 2012) system (Appendix A). The study utilized five probes of this assessment. Each probe consists of 30 grade-appropriate math computation items. Items on the fourth grade assessment measure the following content: basic facts, complex computation, decimals and fractions. Items on the fifth grade assessment measure: basic facts, complex computation, decimals, fractions, conversions and percentages. All probes of the M-COMP mirror the content and placement of items (median alternate-form reliability of M-COMP is 0.88) (Pearson, 2012).

Intervention Procedures

Participants receive 30 minutes of Tier III leveled interventions two times per week, as standard practice in this school. The interventions used for all participants in the study are incremental rehearsal of math facts (both addition and multiplication facts) and cover-copy-compare. The interventions remained constant throughout the conditions of the study.

Student progress is measured weekly using a grade-level eight minute AIMSweb™ probe. Students are aware of the goal they are trying to achieve and see the results of their previous tests each week. When taking this assessment, students are allowed to skip around and solve the problems in whatever order they choose. The only incentive offered to students for reaching their goal is the reduction of Tier III intervention time.

To begin this study, participants received Tier III interventions and their achievement was measured weekly using the M-COMP assessment, as standard practice, for two weeks. Student scores were collected weekly. Each participant's rate of improvement (ROI) was calculated for both reward and non-reward conditions.

After two weeks, participants were offered incentives for improving their weekly M-COMP score. Students were introduced to a contingency-reward program in which they could earn one token for each point they improved their M-COMP score. These tokens could be traded in for prizes each week. Students could choose to spend their token immediately upon receiving it, or save their tokens to be traded in for bigger prizes (refer to Appendix B for list of prizes offered to students). During this experimental phase, participants still received the standard Tier III interventions and intervention time. They were still assessed weekly using the M-COMP assessment and their individual ROI was calculated for both reward and non-reward conditions.

Results

The purpose of this study was to investigate the impact of rewards on Tier III math students' performance on weekly M-COMP assessments. Participants' M-COMP scores were collected during non-reward and reward conditions. These scores were graphed, displaying individual student progress throughout the experimental period (see Figure 1).

Figure 1. Graph of All Participants' Progress on the M-COMP Assessment

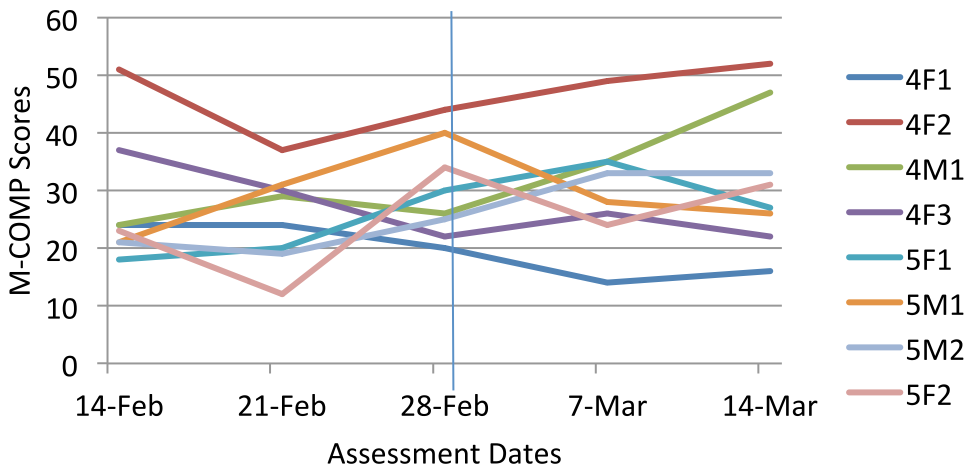

Figure 1. Line graph of all participants' progress on the M-COMP assessment, including no reward and reward conditions. As indicated in the Literature Review and Methods section, the vertical blue line denotes the implementation of the rewards condition.

Overall, five participants' scores increased during the non-reward condition while three participants' scores decreased. Three participants, 5F1, 5F2 and 5M1, displayed a notable increase in their M-COMP scores during the non-reward conditions. Participant 5F1 increased her score by 50%, 5F2 increased her score by 183% and 5M1 increased his score by 29%. Participants 4F2 and 5M2 also demonstrated postive growth on the M-COMP assessment during non-reward conditions. Participant 4F2 improved her score by 19%. Participant 5M2 increased his score by 32%. Participants 4F1, 4M1 and 4F3 all showed a decrease in their M-COMP scores during non-reward conditions. These results are significant to an educator in that, for the majority of the participants, growth on the M-COMP assessment was observed without added incentives or rewards. This data suggests that, in this study, some participants can make positive growth towards their Tier III goals without the need for reward contingenicies.

During the reward conditions, five participants' scores increased while three students' scores decreased. Participants 4M1 and 5F2 experienced the greatest increase under the reward conditions. Participant 4M1 increased his score by 34% and participant 5F2 increased her score by 30%. Participants 4F1 and 4F2 also improved their scores during the reward conditions. Participants 4F3, 5F1 and 5M1 experienced a decreased score during the reward conditions. One participant, 5M2, did not show any change in his score during the reward conditions. This data suggests that the majority of participants in this study demonstrated growth on their M-COMP assessments when offered a reward. This information is significant to an educator because it suggests that, for some students, positive growth towards a Tier III math goal can be obtained during a reward condition.

Individual student performance varied between the non-reward and reward conditions. Participants 4F2 and 5F2 each demonstrated improved M-COMP scores under both conditions while participant 4F3 demonstrated a negative improvement under both non-reward and reward conditions. Participant 5M2 experienced a postive score increase under non-reward conditions and an unchanging score under reward condtions. This data is significant to the researcher because it suggests that some participants' performances are not affected by the reward or non-reward conditions of the experiment.

Figure 2. Comparison of Female Participants' and Male Participants' Performances on the M-COMP Assessments

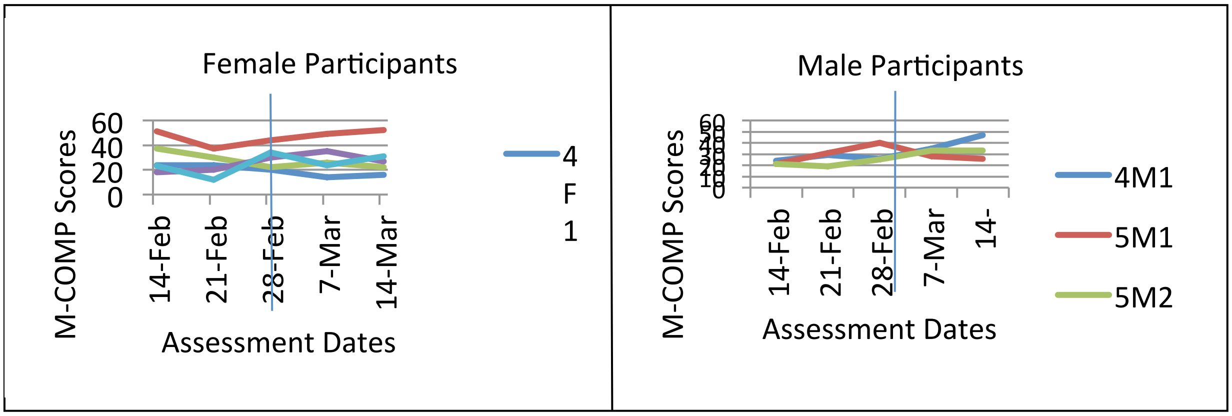

Figure 2. Line graphs of participants' progress on the M-COMP assessments segregated by gender. As indicated in the Literature Review and Methods section, the vertical blue line denotes the implementation of the rewards condition.

In Figure One, I reported general data-based trends but did not distinguish by gender and grade level. To further analyze the data, student progress may be compared based on gender (see Figure 2). During the non-reward conditions, three of the five female participants' scores increased while two of the three male participants' scores increased. Similarly, during the reward conditions, three of the five female participants' scores increased and two of the three male participants' scores increased. This data is signficiant because it suggests that overall, there was no noticable difference in performance between genders during non-reward and reward conditions.

Figure 3. Comparison of Fourth Grade Participants' and Fifth Grade Participants' Performances on M-COMP Assessments

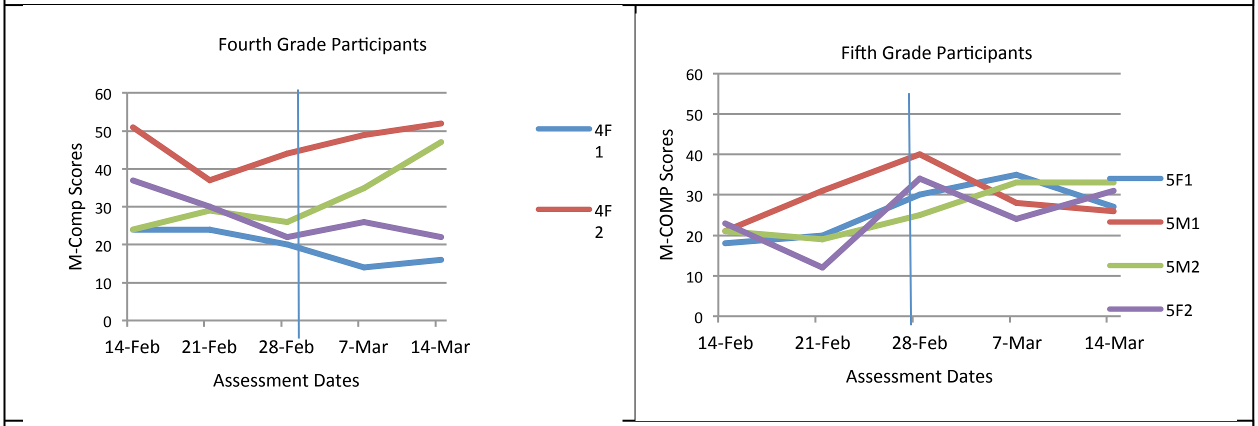

Figure 3. Line graphs of participants' progress on the M-COMP assessments segregated by grade level. As indicated in the Literature Review and Methods section, the vertical blue line denotes the implementation of the rewards condition.

An analysis of grade-specfic data indicates that all fifth grade participants' scores increased during the non-reward conditions (see Figure 3). Once reward conditions were implemented, however, only 5F2's score improved. Of the fourth grade participants, only one (4F2) participant's score increased during the non-reward condition. Upon implementing the reward conditions, three of the four participants in fourth grade displayed an increase in M-COMP scores. This information is significant to the researcher as it indicates that the 5th grade participants in this study, as a group, performed better on their M-COMP assessments during non-reward conditions than during reward conditions. On the contrary, fourth grade participants, as a group, performed better on their M-COMP assessments during reward conditions than during non-reward conditions.

Discussion

The purpose of this study was to investigate the impact of rewards on fourth and fifth grade Tier III math students' performance on weekly M-COMP assessments. The data collected indicated that overall, rewards did not postively impact student performance. As illustrated in the results section, the ratio of students with increased scores and decreased scores remained the same between both reward and non-reward conditions.

When analyzing the data to examine how each gender reacted to the non-reward and reward conditions, the ratios remained constant between conditions as well. Three out of five of the female participants increased their scores during the non-reward conditions and three out of five of the female participants increased their scores during the reward conditions. Likewise, two out of three male participants increased their scores during the non-reward conditions and two out of three male participants increased their scores during the reward conditions.

Perhaps the most significant finding of this research occured when the data was broken down by grade level. Fifth grade participants all increased their M-COMP scores during non-reward conditions. When rewards were introduced, only one fifth grade participant increased her score. In this study, the fifth grade population overall demonstrated more growth on the M-COMP assessment during the non-reward condition. This suggests that with this group of participants, perhaps non-reward conditions promote more growth than reward conditions. Interestingly, the fourth grade sample overall did display more growth during the reward conditions than the non-reward conditions. During non-reward conditions, only one fourth grade participant increased her score while three fourth grade participants increased their scores during reward conditions. Future research should address the difference in grade-level performance under reward and non-reward conditions.

There were several limitations to this research. A very small sample size was utilized and as such, no generalizations to the population can be made. Likewise, due to the nature of the research project, the selection of the sample was a convience sample, not a randomized sample. Weather related school cancellations played a larger role in this research than anticipated and could have impacted student performance. Future research should be done with a sample that truly represents the population and should be conducted over a longer time period.

Additionally, this study was conducted over a short period of time. As a result, the impact of non-reward and reward conditions on long-term student performance cannot be evaluated from this particular study. Future research should investigate the impact of non-reward and reward conditions over an extended period of time.

Numerous confounding variables cannot be ruled out. Instruction provided to participants during their regular classroom lessons, Tier II intervention lessons and at their individual homes might have impacted student performance on the M-COMP. This research does not account for natural student growth that is expected to occur during the school year. In other words, it is difficult to determine if student scores increased because they were or were not offered rewards, or if the scores increased because the students were gaining a better understanding of mathematics. Other confounding variables that might have been present in this study include the time of testing, the mood of the participants, the stress-level of the participants the physical needs of the students at the time of testing (i.e.: Did the student eat breakfast? How did the student sleep the night before?), or possibly something that I could not detect or observe.

This research design does not account for student acclamation to the M-COMP assessment. Students have been taking different forms of this assessment prior to this study, however, it is not possible to rule out the possiblity that some increase in scores could be due to becoming more comfortable or skilled at taking this particular assessment.

The rewards offered to students were selected because they are standardly used in the elementary school setting as rewards. There was no prior research conducted to determine if these specific rewards would appeal to students. Future research should consider this particular limitation when planning for rewards.

As an educator, specficially, as a Tier III interventionist, the findings from this research are particularly interesting. Having suspected that my students were not always giving their best performance on the M-COMP assessment, I am interested that rewards did not seem to have a signficiant impact on overall student performance. However, it is surprising that the fifth grade group responded to the rewards with a decrease in scores while the fourth grade group responded with an increase. Upon designing this project, such a noticable difference between grade levels was not anticipated.

Despite the numerous limitations to this particular study, the results suggest that offering rewards does not significantly increase student performance overall. As expected, each student reacts differently to non-reward and reward conditions. If, in the future, I were to consider offering rewards to my students reciveing Tier III math interventions, I would replicate the reward conditions for fourth grade students. As fifth grade students did not demonstrate significant score increases under reward conditions, in my future practices, I will consider the findings of this research before implementing rewards. Perhaps the sample of fifth grade students selected for this project are not representative of the population and in the future, rewards might facilitate increased M-COMP scores. Or, as this research has suggested, perhaps fifth grade students perform better on the M-COMP assessment under non-reward conditions. Further research is needed to draw conclusions on the grade-level differences found during this study.

In addition to impacting my own classroom, I intend to share my findings with my colleagues and administration. Rewards are used daily in many classrooms within my school. I am eager to share my findings with other educators because I think teachers are quick to assume that rewards postively impact student performance. While this might be true in some cases, I think my research might inspire my colleagues to take a deeper look into their own practices and perhaps, conduct their own research on the effectiveness of rewards in their classrooms. Similarly, given the oppurtunity, I would be eager to share my findings with a broader audience of my peers at a conference. Again, I hope to motivate other teachers to take a second look at their reward procedures within their own classrooms to determine the effectiveness.

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Appendix A

Student: Teacher: Date:

1. $17 + 19 =$	2. $16 - 12 =$	3. 9×1	4. $756 + 73$
5. 7×5	6. 51×3	7. $441 + 56$	8. 8×8
9. $668 - 293$	10. 3×6	11. $314 + 235$	12. 21×6
13. $263 - 62$	14. 9×2	15. $632 - 330$	16. 4×6
17. $2\overline{)10}$	18. $8.4 + 7.6$	19. 53×2	20. $\frac{4}{8} + \frac{3}{8} =$

Student: Teacher: Date:

21. $7.0 + 2.2$	22. 7×3	23. $8\overline{)72}$	24. $5\overline{)35}$
25. $\frac{4}{7} - \frac{2}{7} =$	26. 57×5	27. $9.9 - 1.4$	28. $3654 - 3512$
29. $555 + 523$	30. $21\overline{)567}$	31. $5556 + 2337$	32. $3.5 - 1.6$
33. $5585 - 2291$	34. $556 - 86$	35. $\frac{5}{10} + \frac{4}{10} =$	36. $3401 + 3066$
37. $\frac{3}{6} - \frac{2}{6} =$	38. $4\overline{)102}$		

Student: Teacher: Date:

1. $15 \times 3 =$	2. $78 \div 13 =$	3. Write the fraction in lowest terms $\frac{11}{66} =$	4. 19×10
5. $590 + 260$	6. Write the fraction in lowest terms $\frac{5}{15} =$	7. 18×5	8. $0.66 + 0.11$
9. $546 - 362$	10. Write the fraction in lowest terms $\frac{3}{24} =$	11. $5\overline{)56}$	12. 281×11
13. 421×42	14. $4.14 + 1.07$	15. $17\overline{)136}$	16. $5.91 - 3.73$
17. 317×41	18. $0.83 - 0.03$	19. $\frac{6}{49} + \frac{7}{49} =$	20. 148×7

Student: Teacher: Date:

21. $4\overline{)284}$	22. Convert to fraction $0.07 =$	23. $5\overline{)63}$	24. 11×0.1
25. 332×3	26. $\frac{4}{22} + \frac{3}{22} =$	27. $\frac{36}{48} - \frac{13}{48} =$	28. 40% of 65 =
29. $\frac{19}{27} - \frac{5}{27} =$	30. $\frac{3}{5} \times \frac{1}{2} =$	31. $8\overline{)426}$	32. 45×1.2
33. Convert to decimal $\frac{92}{100} =$	34. $\frac{9}{20} \times \frac{3}{20} =$	35. Convert to fraction $0.11 =$	36. $3\overline{)1.2}$
37. Convert to decimal $\frac{47}{100} =$	38. 90% of 90 =	39. $50\overline{)210}$	

Appendix B

One Token	Three Tokens	Five Tokens	Eight Tokens	Ten Tokens
pencil	pencil sharpener	slap bracelet	Nerf™ ball	Subway™ lunch
stickers	fun-sized candy	Lip Smacker™ chapstick	soft flying disc	Casey's Pizza™ lunch
erasers	key chain	SpongeBob™ bracelet	soda	Model Magic™ art kit
small piece of candy		rubber band bracelet kit	king-sized candy bar	water bottle
		book cover	time on Ipad	
			popcorn	