Improving Homework Performance in Grade 6, 7 and 8 Students Using an Interdependent Class-Wide Group Contingency with Randomized Criterion and Reinforcers

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Dedication

This thesis is dedicated to my family, friends, and teachers that have always been there and who have never stopped supporting me on this four-year journey. Most importantly I’d wish to dedicate this thesis to my mom, the person who has always being the biggest inspiration and hero in my life.
Abstract

In elementary schools today, homework is regularly assigned by teachers every night and is to be completed outside of the classroom. There are a number of empirical studies that have successfully made an association between homework completion and the positive success of students’ academics. Many teachers and parents are concerned that a lack of homework completion has a negative effect on overall academic grades and productivity for students. This study employed an interdependent class-wide group contingency. Randomized criteria and randomized reinforcers were used in order to improve homework performance in 24 grade 6, 7, and 8 students in a regular elementary school classroom. An ABC design across all students was implemented. The results of the study showed this intervention to have been ineffective in increasing the completion and the accuracy rates of the student’s regularly assigned mathematics homework. Limitations, recommendations, and future research are all addressed.
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Chapter I: Introduction

Problem Statement

In elementary schools today, homework is regularly assigned by teachers every night and is to be completed outside of the classroom. Homework assignments differ between grades and subjects and take into account many school-based skills, which include: reading, writing, and problem-solving skills, etc. Homework is often a continuation of a school activity from earlier in the day or is directly connected to the subject being learned about in the classroom. However, because there is usually not a connected consequence for a student completing homework assignments, completion and accuracy of these tasks are rational objectives for a change in behaviour (Olympia, Sheridan, Jenson, & Andrews, 1994). Many teachers and parents are concerned that a lack of homework completion has a negative effect on overall academic grades and productivity for students (Miller & Kelley, 1994).

Rationale for Research

There are a number of empirical studies that have successfully made an association between homework completion and the positive success of students’ academics (Theodore, Dioguardi, Hughes, Aloiso, Carlo & Eccles, 2009). According to Rathvon (1999), a concern associated with homework completion for teachers and parents focused on the students not having self-discipline, or the necessary academic skills to successfully complete their homework assignments. Rathvon (1999) adds that students continue to be unmotivated with the completion of their homework despite negative consequences being linked to the incompletion of their homework. Rosenberg (1989) noted that homework tasks that were completed both fully and correctly ended up being the most beneficial for elementary school students.

Due to the time and ratio of teacher-to-student constraints, it appears much more practical to attempt to implement a group contingency in a classroom setting than an individual intervention. Applied research data has established how contingencies have been used in groups successfully (Davis & Chittum, 1994; Harris & Sherman, 1974; Theodore et al., 2009). Brantley and Webster (1993) further state that there has been an increase in behaviour analysts focusing their attention to group contingencies being used in school wide applications, as well as classrooms. School wide and classroom group contingencies have shown that, when managed properly, are an effective and useful approach when needing to change the behaviour of many individuals simultaneously (Stage & Quiroz, 1997). According to Litow and Pumroy (1975), a group contingency is defined as a common consequence; frequently used as a reward for the behaviour of one single group member, part of a group, or of the entire group. When implementing a group contingency: an effective reward must be selected, the behaviour to change must be determined, the appropriate performance criteria must be set, other procedures should only be combined when suitable, the most fitting group contingency should be selected,
and both individual and group performance should be monitored (Poplin & Skinner, 2003). School psychologists or behaviour analysts who collaborate with teachers to design homework interventions have found the most success with classroom wide interventions in attempts to create a treatment plan to improve homework performance in elementary school settings (Zins & Erchul, 2002). Zins and Erchul (2002) also explain that these interventions must be efficient in terms of time, non-intrusive, implement must be easy in order to obtain the most successful results during a classroom-wide intervention.

An interdependent group contingency is a group contingency where all the participants in the group have to meet the predetermined group condition of the contingency before the group can earn the reward (Elliot, Busse, & Shapiro, 1999). Interdependent group contingencies have an advantage as opposed to dependent and independent group contingencies because they force groups to achieve a collective goal, which focuses on positive peer pressure and group relationship building (Elliot et al, 1999). According to Poplin and Skinner (2003), an interdependent group contingency can be administered in more than one way. These approaches include the entire group meeting the goal or the group achieving a mean group score (Poplin & Skinner, 2003). Poplin and Skinner (2003) conclude that these interdependent group contingencies represent an all or nothing procedure, meaning all of the students can earn the reinforcement or none of the students earn the reward. Other advantages of an interdependent group contingency include: the formation of the interaction of peers as the class works towards a common goal, time efficiency for teachers as they only have to keep track of one contingency program, and the avoidance of potential rejection from peers because either the entire class succeeds or fails to earn a reinforcer (Kelshaw-Levering, Sterling-Turner, Henry, & Skinner, 2000). An interdependent class-wide contingency that was student-administered was successful in increasing the completion of math homework assignments in sixth-grade students (Olympia et al., 1994).

In order to prevent the possible negative aspects of an interdependent group contingency, conditions for obtaining reinforcement can be randomized (Popkin & Skinner, 2003). Reinforcers that are randomized have been successfully used in conjunction with class-wide interdependent group contingencies (Madaus, Kehle & Bray, 2003). Results for enhancing academic performance have suggested that by randomizing the criteria for reinforcement, the students become encouraged in adjusting their behaviour based on the fact that they will not know what the specifics for achieving a desired reinforcer will be (Popkin & Skinner, 2003)

**Thesis Statement/ Overview of the Study**

It is hypothesized that the implementation of an interdependent class-wide group contingency with randomized criterion and randomized rewards, in order for the completion of and the accuracy of homework to be improved, will directly increase both the accuracy of and the completion of homework for the grade 6, 7 and 8 students.
Chapter II reviews the current literature in order to assess the empirical support for the use of the proposed behavioural intervention strategy. Chapter III describes the methodology used in the study and the research implementation procedures used. Chapter IV summarizes the results and interpretations of the data collected, and Chapter V discusses the conclusion of those results, the overall success of the experiment, as well as the limitations of the study and future recommendations.
Chapter II: Literature Review

The Implications of Homework Incompletion

Test scores measuring achievement from the United States have been declining and academic achievement ranks have been displayed as mediocre, leading to a major concern to educators and the parents of students (Miller & Kelley, 1994). Miller and Kelley (1994) continue to state that in response to these findings, researchers have acknowledged multiple reasons associated with a decline in academic achievement, one of which is most notably homework. Conference requests for students struggling academically often focus on detecting efficient and effective interventions in order for educators to gain a better understanding and grasp on the homework procedure so that the academic accomplishments of students can ultimately be increased (Theodore et al., 2009). Theodore et al. (2009), additionally elaborate on the fact that even though the literature supports homework being a successful educational tool, it still presently remains a concern of teachers and parents. Rathvon (1999) described that a concern associated with homework completion for both teachers and parents focused on the students not having self-discipline or the necessary academic skills to successfully complete their homework assignments. Rathvon (1999) added that students continue to be unmotivated with the completion of their homework despite negative consequences being linked to the incompleteness of their homework. Olympia et al. (1994) explained how even though motivation is seen as an essential element of student success, a student’s homework will fail to be useful if the student fails to complete it and more importantly if the completed assignment includes multiple errors and is incorrect. Furthermore, the failure of completion of homework assignments and homework completed with frequent errors can be linked to increased referrals for special education (Anderson, Cronin, and Miller, 1986).

Homework Completion and Academic Success

A number of empirical studies have successfully made an association between homework completion and the positive success of students’ academics (Theodore et al., 2009). Completion of homework significantly influences general academic performance of those students in the classroom (Theodore et al., 2009). Rosenberg (1989) further noted that homework tasks that were completed both fully and correctly ended up being the most beneficial for elementary school students. Further research has also indicated encouraging results of homework being completed and scholastic accomplishment in intermediate grade elementary students (Rosenberg, 1989). Similarly, the relation between the completion of homework and a student’s performance in academics is correlated based on the length of time spent accomplishing assigned homework (Cooper, 2001). Benefits of homework can incorporate both understanding and retention of the information learned in class (Gajria & Salend, 1995). Epstein and Van Voorhis (2001) further comment on how homework helps students practice the new skills learned at school and can provide them with the chance to exhibit mastery. Furthermore, Cooper (2001) commented on
how homework activities have non-academic outcomes such as a relationship between school and home, the involvement of parents, the creation of appropriate schoolwork behaviours, establishment of time management abilities, and the formation self-discipline habits. Other than ability, studies have shown that the amount of time a student spends on homework was the most evident predictor of the grades and accomplishments academic-wise of students (Miller & Kelley, 1994). Other experimental results have confirmed that an increased quantity of time spent on homework had a positive correlation with increased success and academic levels for students of all ability levels (Keith, 1982). Additional studies that have investigated homework as an independent variable examined whether or not the use of homework would increase the academic marks of students (Maertens & Johnston, 1972). Miller and Kelley (1994) further expand by stating that homework did in fact significantly advance test scores in comparison to a condition involving the absence of homework being assigned. This acknowledges homework as having a positive association with an overall increase in the achievement of academic results (Miller & Kelley, 1994). Furthermore, as opposed to other variables such as a student’s ability or their socioeconomic status, a variable that can be influenced to improve the academic achievement of students is homework (Keith & Page, 1985). Bandura and Schunk (1981) successfully used goal setting in elementary school classroom environments with children across a vast array of abilities and age range in order to effectively increase overall homework performance and academic success. Although, the indications are present regarding homework being a valued contributor to increasing the academic success of students who would otherwise struggle with or fail to complete their homework, research involving interventions for an increase in homework performance still remain limited (Miller & Kelley, 1994). However, despite the research remaining limited, the majority of studies focusing on the improvement of homework performance have noted success with the use of group contingencies in elementary school classrooms (Olympia et al., 1994).

**Group Contingencies Used for Homework Completion and Accuracy**

Group contingencies have shown to be effective in changing variables including disturbing behaviour, achievement in academics, and homework completion (Theodore et al., 2009). A group contingency is defined as a common consequence that is frequently used to reinforce the behaviour of one single group member, part of a group, or of the entire group (Litow & Pumroy, 1975).

In order to better improve homework completion and accuracy in students, a group contingency involving an entire class, can be an efficient way to achieve success (Theodore et al., 2009). Furthermore, group contingencies are attractive options to teachers due to the fact that they do not require much time or effort to implement, are used for the entire classroom, and incorporate attention from peers and the influence of other classmates (Theodore et al., 2009). Theodore et al. (2009) note that class-wide interventions can be approached from a number of angles, all shown to have successful results. These can include dividing all the students into
teams, taking the entire class’s performance and averaging it out, having one objective be met by the whole class, etc. (Theodore et al., 2009).

Harris and Sherman (1974) discovered evidence that going out early for recess and being dismissed from school for grade six students created an improvement of homework accuracy and completion. The educators in this experiment allowed those students who completed their homework with a benchmark of 80% or higher accuracy to depart 15 minutes early from school each day (Harris & Sherman, 1974). The intervention implemented by Harris and Sherman (1947), increased both the amount of students in the classroom who completed their homework and the overall accuracy of those completed homework assignments. In a follow-up research study, the researchers were able to demonstrate that only the homework completed at an acceptable level of accuracy ended up improving classroom and academic performance (Harris & Sherman, 1974). This, as explained by the authors, was in opposition to those students who completed their homework, but who did so inaccurately (Harris & Sherman, 1974).

Cooper (2001) additionally notes how academic on-task behaviour and work accuracy may be directly linked to a student’s academic comprehension and range of academic ability, and the presence of developmental or learning disabilities. This can make it difficult to determine which variable to target when dealing with a student(s) who exhibits problems with academic on-task behaviour and homework completion, especially when using a class-wide intervention program, as individual student needs may get lost amidst the class as a whole attempting to achieve their goal (Cooper, 2001).

An experiment by Madaus et al. (2003) investigated the effectiveness of a mystery motivator in the advancement of homework accuracy and completion, which indicated success with fifth-grade students. Interdependent group contingencies in elementary school classrooms have been deemed successful in increasing overall homework performance in students who struggle with homework completion and accuracy (Madaus et al., 2003).

**Interdependent Class-Wide Group Contingencies**

Many studies have shown that interdependent group contingencies have been used successfully in classroom settings. An interdependent group contingency is one where all the participants in the group have to meet the predetermined group condition of the contingency before the group can earn the reward (Elliot et al., 1999). Interdependent group contingencies have an advantage as opposed to dependent and independent group contingencies because they force groups, and in this case students, to achieve a collective goal, which focuses on positive peer pressure and group relationship building (Elliot et al., 1999). The interdependent group contingency has multiple significant advantages such as the formation of the interaction of peers as the class works towards a common goal, time efficiency for teachers as they only have to keep track of one contingency program, and the avoidance of potential rejection from peers because either the entire class succeeds or fails to earn a reinforcer (Kelshaw-Levering et al., 2000).
However, in contrast, several disadvantages do exist with the implementation of interdependent group contingences (Kelshaw-Levering et al., 2000). First off, compliant students who proceed to follow the class criteria might begin to become agitated because they are not receiving rewards since the whole class failed to achieve the specified criteria (Kelshaw-Levering et al., 2000). This may result in those student or students having resentment towards those individual or individuals that did not accomplish the homework criteria and hindered the class from receiving the reinforcement (Kelshaw-Levering et al., 2000). Kelshaw-Levering et al. (2000) further state that if the reinforcer that is chosen is unappealing or unwanted, the motivation and desired change for an individual or for multiple individuals in the class may not be generated. This could further lead to those students continuing to deliberately engage in the undesirable behaviour of not completing their homework in attempts to sabotage the program (Kelshaw-Levering et al., 2000). Kelshaw-Levering et al. (2000) continue to describe that if students recognize that their chance at obtaining reinforcement continues to be lost, they may choose to stop complying with the class homework requirements. Additionally, changing one area of behaviour could result in other problem behaviours being displayed at the same time, specifically a potential for a decline in other academic areas (Kelshaw-Levering et al., 2000).

The literature has stated that contingency planning has been created in case of the intervention causing problem behaviours that can arise such as: compliant student frustration with the class, an unappealing reinforcer being used, lost opportunities creating undesirable behaviour, and the potential emergence of other problem behaviours or academic decline that may manifest during intervention (Kelshaw-Levering et al., 2000).

An interdependent class-wide contingency that was student-administered was found successful in increasing math homework assignment being completed in grade 6 students (Olympia et al., 1994). The findings by Olympia et al. (1994) explained how homework completion and accuracy rates of the students improved based on the student’s participating in homework teams. Twelve of the sixteen students in the study by Olympia et al. (1994) exhibited a minimum of 20% more complete homework assignments in comparison to the baseline phases. Students who selected their own goals of performance made much greater improvements in the number of assignments submitted when compared to the students who had their goals selected by the teacher in the classroom (Olympia et al., 1994). Olympia et al. (1994) additionally note how a limitation of their study was the student subject selection, which was chosen based on the student’s displaying an academic deficit in performance as opposed to a skill deficit, not being directly tested and impacting the scope of treatment effects. Further, the effectiveness of the intervention was restricted due to the data collection not being able to be continued passed the final intervention section of the study (Olympia et al, 1994). The absence of a control group makes it impossible to conclude if the results of the study were based solely upon the intervention itself (Olympia et al., 1994). Likewise, non-academic effects based on a student’s homework such as the motivation of students, the effect on parents or family, and the ideation of cheating, have still not been accounted for in the literature (Olympia et al., 1994). To prevent possible negative aspects of an interdependent group contingency, conditions for obtaining
reinforcement can be made to be random (Popkin & Skinner, 2003). Randomized reinforcers have also been successfully used in conjunction with class-wide interdependent group contingencies (Madaus et al., 2003).

**An Interdependent Class-Wide Group Contingency with Randomized Reinforcers**

Randomized reinforcers are referred to as a mystery motivator or secret reinforcers used to encourage a student (Madaus et al., 2003). Madaus et al. (2003) explain that there are two primary benefits for the use of randomized reinforcers. First, this approach decreased the chances that students will sabotage their program on purpose because of dislike for the reward that has been selected (Madaus et al., 2003). Secondly, due to the reinforcement being a secret, students tend to have less of a probability to become frustrated and disappointed for not obtaining desirable reinforcement (Madaus et al., 2003). In attempts to evade the undesirable results produced from an interdependent group contingency, the criteria for obtaining reinforcers can be altered to randomized (Popkin & Skinner, 2003). Popkin and Skinner (2003) add that recent studies have incorporated the reinforcement criteria being randomized while working with students engaging in disruptive behaviour or when trying to improve the academic success of students. Results for enhancing academic performance have suggested that by randomizing the conditions for reinforcement, the students become encouraged in adjusting their behaviour based on the fact that they will not know what the specifics for achieving a desired reinforcer will be (Popkin & Skinner, 2003). In addition, despite the individual differences expected to be present in student performance and skill, all of the students in the classroom are still given a chance to receive a reward that is a mystery, and will be able to know for certain that what ended up costing the entire class an opportunity to obtain a reward, was not based on their individual performance (Popkin & Skinner, 2003).

Theodore et al. (2009) used an interdependent group contingency with randomized reinforcers, in order to increase homework accomplishment and the correctness of spelling schoolwork in students attending an elementary school, using a reversal design. The results of the study demonstrated that the interdependent group contingency with reinforcers that had been randomized had a positive impact on both the completion and accuracy of the students spelling homework (Theodore et al., 2009). The students who performed well at baseline sustained and somewhat enhanced spelling accuracy and completion rates, while those students who originally produced poor baseline results, ended up showing more considerable improvements (Theodore et al., 2009). Achievement rates at baseline across subject areas were very high and ranged between 89% to 98%, and these convincing baseline displays may have ended up limiting the quantity of available alteration that could have potentially been administered (Theodore et al., 2009). Theodore et al. (2009) also noted that the intervention phase might have acted as reinforcement for the development of suitable homework behaviours, explaining that homework behaviours that are positive, continued to potentially be maintained by consequences that were occurring naturally such as verbal praise or good grades. Gresham and Gresham (1982) state
how using randomized reinforcers are more successful than reinforcers identified beforehand, which could lessen their charm, leading to very small or no behaviour alteration due to these reinforcers having no incentive to improve performance. Cancio, West, and Young (2004) explain how, as with all single-subject designs, the results and findings are limited to generalization and are also restricted to students that are comparable to those individuals in a conducted study. The randomized criteria and reinforcers should occasionally be changed so that the satiation of reinforcers does not occur with the students as a limiting factor, and a reinforcement should eventually be altered to a variable schedule in order to fade out the program (Cancio et al., 2004). Cancio et al. also explain how when using a interdependent group contingency with randomized reinforcers, another potential evident limitation is the idea of ceiling effects being found in situations where students were unable to achieve improvements substantially. This, however, may not be avoidable in some studies, since as a regular elementary classroom setting contains a wide-range of performance levels being found in the students (Cancio et al., 2004). Zinus and Erchul (2002), conclude that classroom-based interdependent group contingencies with randomized reinforcers show great potential for the enhancement of homework completion and accuracy in elementary school students. In combination with successful results in homework quality, interdependent group contingencies with randomized reinforcers are also efficient in terms of the amount of time saved for teachers, are easy to implement for an entire class, and are inspiring academically for both the students in the classroom, as well as the teacher (Zinus and Erchul, 2002).
Chapter III: Method

Participants, Staff, and Setting

The participants included a combination of one entire class of 25 grade 6, 7 and 8 students, between the ages of 11 and 13 years old, who attend the same elementary school. The study was created, implemented and analyzed by a fourth year Behavioural Psychology (BPSYC) student from St. Lawrence College. A consent form was sent home to all the parents and/or guardians of the students in the class, outlining the information regarding the study, a general overview, the specific project methodology, procedures, benefits and risks etc. The consent form was required to be signed by the parents or guardians of the students and had to be returned to the Behavioural Psychology student in order for the grade 6, 7, or 8 student to be included in the study. All students returned their consent forms, however one student decided to opt out and remove themselves from the study after the first day of the initial intervention stage.

Research Design, Strategy, Measures

An ABAB reversal design was initially going to be used in the study, but was altered throughout the experiment to account for time and the data from the first intervention phase. An ABC design was instead implemented. This was completed using an interdependent class-wide group contingency in order to establish the effectiveness of the proposed intervention, which included randomized reinforcers for the accomplishment and performance for the student’s math homework. Mathematics was the academic area selected because based on the classroom teacher’s view, it was the subject most intermediate students struggle with, is most commonly assigned for homework, and is easier to collect data on as the subject is graded on a finite percentage basis. The independent variable in the study was the group contingency reinforcement and reward, as well as the dependent variable was the completion and accuracy of the student’s math homework.

A one-question homework survey (Appendix A) was administered to the class (accompanied with the preference assessment). All answers from the students were recorded anonymously. The question asked had to do with the student’s opinion on the math homework they were receiving every night, including why they do or do not complete it. A short preference assessment was additionally conducted with the students (accompanied with the functional assessment survey question in Appendix A). The question on the survey asked the students what rewards they felt would positively motivate them to complete their math homework every night. The responses from this preference assessment were taken into account for the potential rewards that were to be given out during the intervention of the interdependent group contingency.

Baseline data was collected every morning to measure the student’s math homework completion from the night before for 10 consecutive school days (Appendix B) and was
displayed in a chart (Figure 1) and graph (Figure 2). The data confirmed that there was indeed a need for a class-wide behavioural intervention in attempts to increase student’s math homework completion.

Homework accuracy was not originally intended to be collected during the program, however it was added later as an extra measure in order to ensure that students were not rushing through the completion of their work and writing down random answers to the homework questions without actually taking the time to complete the work. Baseline data would have ideally been collected for homework accuracy, however the BPSYC student initially only focused the program solely on the homework completion of the students in the class. The absence of baseline data for homework accuracy will be addressed in the limitations section of the program. Although baseline data was not recorded for homework accuracy, the BPSYC student felt it would be beneficial for the students and the thesis program to begin to record homework accuracy simultaneously when the intervention for homework completion began.

**Dependent Variables**

Homework completion in mathematics was defined as the turning in of homework, which the students will have to complete 100% of what was assigned in order for their homework completion to be recorded as completed. Homework accuracy was described as the percentage of questions answered correctly based on a sample of one of the math sheets assigned to the class (if more than one was assigned). The percentages of math homework completion and accuracy were collected, recorded and measured daily by the BPSYC student. Therefore, the dependent variable in the experiment was defined as the class scores from the student’s homework completion or accuracy results.

**Independent Variables**

The independent variable was defined as the randomized criterion and the randomized reinforcers that were selected each day. Visual analysis in the forms of graphs and charts would be the primary form of data analysis for this program. A chart and a graph in Appendix C were used to represent baseline data for student’s math homework completion results. Intervention data for student’s math homework completion and accuracy results was represented in Appendix D in the form of a chart and a graph. Similarly, a chart and a graph in Appendix E were used to represent reinstatement of intervention data for student’s math homework completion and accuracy results. Finally, the mean data values for homework completion and accuracy results for each of the three phases in the program were represented and compared in a chart in Appendix F.
Research Implementation Procedures

The ‘A’ phase of the study was defined as baseline, the ‘B’ phase as intervention, and the ‘C’ phase was defined as the reinstatement of the intervention.

Baseline: The BPSYC student and the teacher determined the mathematics performance measures to address the completion of the questions each morning before the homework was handed out to the students at the end of each day. No incentive program was put in place during baseline and the structure of the phase mirrored that of the usual homework procedures that were in place by the classroom teacher. Baseline data was taken for ten days.

Intervention: Before the intervention began, the BPSYC student explained to the classroom teacher how to implement the interdependent class-wide group intervention. The classroom teacher then notified the students that they would be able to earn rewards for the completion rates and percentage performance demonstrated (accuracy rates) on the math homework assigned regularly Monday to Friday. Furthermore, it was explained to the students that the criteria for successfully achieving a reinforcer for the completion of and accuracy of their math homework would be selected at random every day. Additionally, the BPSYC student created a chart that was displayed in the front class during the intervention so the class had a visual aid representing the data, the criterion selected, the class result from that day based on the objective, and what reward was earned if the objective was met. The BPSYC student had a class list page with each student’s name and student number for the study on it in order to record the results each day, which was divided into 25 rows and 10 columns. This was so that for each day it could be recorded whether the assignment was finished on time (completion) or so that the questions answered correctly (accuracy) could be recorded. If a student had been absent the day before when the homework was assigned, they were not included in the data results for the next day. Similarly, if a student was absent the day the homework was collected and recorded, they were not included in the data for that day. The condition for the class was determined each morning through the random selection of one piece of paper from the first of two jars. The first jar was titled “Goal For Today” and there were ten possible criteria, one for each day, which included: 1) class completion average of 100%, 2) class completion average of 90% or above 3) class completion average of 85% or above, 4) class completion average of 80% or above, 5) class completion average of 80% or above, 6) class accuracy average of 85% or above, 7) class accuracy average of 80% or above, 8) class accuracy average of 75% or above, 9) class accuracy average of 70% or above, and 10) class average of 65% or above. The classroom teacher and BPSYC student both emphasized that in order for the reward to be obtained, the class needed to work together as a team. The second jar was titled “Reward Earned” and there were ten possible criteria, one for each day, which were chosen based on the student’s answers in the preference assessment survey. These rewards included: 1) ½ a movie (could be combined with the other ½ a movie reward), 2) ½ a movie, 3) a box of timbits for the class, 4) candy/ chocolate, 5) a healthy
snack, 6) a “no homework pass” for one night, 7) student’s being given access to their phones/devices for an entire day, 8) a 15 minute longer gym period, 9) a 10 minute longer access to the student’s phones/devices (twice for one day), 10) 25 minutes that could be used one day for a class educational/learning game.

If the class met the objective that was chosen at random from the first jar that day, then one reinforcer was selected from the second jar titled, “Reward Earned”. The students completed a preference assessment and the reinforcement results were selected based off of the conducted preference assessment survey and the proposed rewards suggested by the teacher. If successfully obtained, the reinforcer was administered to the class by the teacher at a suitable time that day at school or was recorded and given out on a future different date depending on the nature of the reinforcer. If the students did not reach the objective drawn from the first jar, then the teacher addressed the class stating that the criterion was not met. Intervention data was recorded for ten days.

Reimplementation of Intervention: For the reimplementation of the intervention phase, the classroom teacher informed the students that the class would again be able to earn rewards for their math homework achievement and accuracy. The criteria represented on the slips of paper in the first jar were lowered based on the results from the first intervention. This was referred to as the relaxed criterion based on the low levels of access to the rewards in the intervention section of the program. However, the rewards remained identical to the original treatment phase, as only two of the ten rewards were earned. There were again 10 possible criteria, one for each day, which included: 1) class completion average of 80% or above, 2) class completion average of 75% or above 3) class completion average of 70% or above, 4) class completion average of 65% or above, 5) class completion average of 60% or above, 6) class accuracy average of 75% or above, 7) class accuracy average of 70% or above, 8) class accuracy average of 65% or above, 9) class accuracy average of 60% or above, and 10) class average of 55% or above. Once again, the BPSYC student created the exact same chart that was displayed in the front class during the intervention phase, so the class had a visual aid representing the data, the criterion drawn from the jar, the class result from that day based on the objective, and what reward was earned if the objective was met. Reimplementation to intervention data was recorded for a period of ten days.
Chapter IV: Results

The thesis program using an interdependent class-wide group contingency with a randomized criterion and randomized rewards, was implemented for a total of 20 days and was shown to be unsuccessful in increasing the student’s homework completion for the grade 6, 7 and 8 students.

Functional Assessment Results

The result of the functional assessment indicated that the highest response of the student’s opinions of math homework was that it was just the right amount with 13 responses, while the second highest response of 7 students believed that the math homework they received each night was that it was too easy.

A short preference assessment was additionally conducted with the students (accompanied with the functional assessment survey question in Appendix A). The question on the survey asked the students what rewards they felt would positively motivate them to complete their math homework every night. The results of the preference assessment indicated that the student’s most frequent selection of preferred reinforcement were treats/ candy/ food which had 16 responses, while a movie on a Friday afternoon had the second highest value with 13 responses. The responses from this preference assessment were taken into account for the potential rewards that were given out during the intervention of the interdependent group contingency.

Baseline Results

<table>
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<tr>
<th>Day</th>
<th>Percentage Completed (%)</th>
</tr>
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<tbody>
<tr>
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</tr>
<tr>
<td>2</td>
<td>72.7</td>
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<td>3</td>
<td>63.6</td>
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<td>6</td>
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<td>7</td>
<td>57.7</td>
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<td>8</td>
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<tr>
<td>9</td>
<td>61.5</td>
</tr>
<tr>
<td>10</td>
<td>53.8</td>
</tr>
</tbody>
</table>

**Average** 61.8

*Figure 1:* Chart of Baseline Data for Student’s Math Homework Completion
Baseline data was collected every morning to measure the student’s math homework completion from the night before for 10 consecutive school days (Appendix B) and was displayed in a chart (Figure 1) and graph (Figure 2).

The results were collected using permanent product recording and indicated that the mean homework completion percentage for the students was 61.8%. The data confirmed that there was indeed a need for a class-wide behavioural intervention in attempts to increase student’s math homework completion.

According to Tawney and Gast (1984), to consider the data stable, 80% or more of the data points would need to fall within 15% of the mean. The mean baseline homework completion percentage for the students was 61.8%. Fifteen percent above the mean would be 76.8% and 15% below the mean would be 46.8%. The baseline homework completion data results concluded that 100% (10/10) of the data points were within 15% above or below the mean of 61.8%. This indicated that the baseline homework completion data was in fact stable.
Completion Results

<table>
<thead>
<tr>
<th>Day</th>
<th>Percentage Completed (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>52</td>
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<tr>
<td>2</td>
<td>40</td>
</tr>
<tr>
<td>3</td>
<td>81</td>
</tr>
<tr>
<td>4</td>
<td>41</td>
</tr>
<tr>
<td>5</td>
<td>68</td>
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</tbody>
</table>

*Average* 56.4

**Figure 3:** Chart of Intervention Data for Student’s Math Homework Completion

<table>
<thead>
<tr>
<th>Day</th>
<th>Percentage Completed (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>70</td>
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<tr>
<td>2</td>
<td>61</td>
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<tr>
<td>3</td>
<td>42</td>
</tr>
<tr>
<td>4</td>
<td>63</td>
</tr>
<tr>
<td>5</td>
<td>48</td>
</tr>
</tbody>
</table>

*Average* 56.8

**Figure 4:** Chart of Reinstatement of Intervention Data for Student’s Math Homework Completion
**Figure 5:** Graph of Homework Completion Percentage Data for All Phases of Program
Completion - Intervention

The intervention data for student’s math homework completion was recorded (Appendix D). The data was collected in the classroom every morning as soon as the students entered the class and deposited their homework assignments. The results were recorded over a 10-day period, with ten slips of paper being put into the criterion jar titled “Goal For Today”. Five of the slips of criteria paper involved homework completion and the other five measured homework accuracy, to make up the ten days. Therefore the criterion for each day of intervention was random with five of the days over the 10-day period collecting data for completion and the other five measuring accuracy.

Intervention completion data was displayed in both chart (Figure 3) and graph (Figure 5) form. The intervention completion percentage data was collected using permanent product recording and indicated that the mean homework completion percentage for the students over the five days recorded was 56.4%. Figure 3 showed that over the five days that a completion criterion was drawn, that the lowest percentage achieved was 40% and the highest percentage achieved was 81%. The trend line shown on Figure 5 showed a very slow and gradual increase in intervention homework completion percentage over the five-day period.

According to Tawney and Gast (1984), to consider the data stable, 80% or more of the data points would need to fall within 15% of the mean. The mean intervention homework completion percentage for the students was 56.4%. 15% above the mean would be 71.4% and 15% below the mean would be 41.4%. The intervention homework completion data results concluded that 20% (2/5) of the data points were within 15% above or below the mean of 56.4%. This indicated that the intervention homework completion data was not stable. However due to time constraints, despite the data not being considered stable, the program had to continue.

Completion - Reinstatement of Intervention

Reinstatement of intervention completion data was displayed in both chart (Figure 4) and graph (Figure 5) form. The reinstatement of intervention completion percentage data was collected using permanent product recording and indicated that the mean homework completion percentage for the students over the five days recorded was 56.8%. Figure 4 showed that over the five days that a completion criterion was drawn, that the lowest percentage achieved was 42% and the highest percentage achieved was 70%. The trend line shown on Figure 5 showed a very slow and gradual decrease in intervention homework completion percentage over the five-day period.

According to Tawney and Gast (1984), to consider the data stable, 80% or more of the data points would need to fall within 15% of the mean. The mean reinstatement of intervention homework completion percentage for the students was 56.8%. 15% above the mean would be 71.8% and 15% below the mean would be 41.8%. The reinstatement of intervention homework completion data results concluded that 100% (5/5) of the data points were within 15% above or
below the mean of 56.8%. This indicated that the reinstatement of intervention homework completion data was in fact stable.

To compute the PEM (Percentage of Data Points Exceeding the Median) score in Figure 5, according to Gao and Ma (2006), the first step was to draw a horizontal median line in the baseline phase. The median line stretched out horizontally to the intervention and reinstatement of intervention phase (Gao and Ma, 2006). The second step was to calculate the percentage of the data points of the intervention and reinstatement of intervention phase above the median line (Gao and Ma, 2006). Since the treatment was to increase a desired behaviour Gao and Ma (2006) state that the PEM score was the percentage of data points above the median line in the intervention and reinstatement of intervention phase. The median from the homework completion baseline data was calculated to be 61.5%. Using the horizontal median line it was recorded that 40% (4/10) data points were above the median line in the homework completion intervention and reinstatement of intervention phase. Therefore the PEM score for the homework completion data was 40%.

Gao and Ma (2006) further state that a PND (Percentage of Non-Overlapping Data) score is computed by calculating the proportion of data points in a treatment phase above the highest phase above the highest data point of the immediately preceding baseline phase. In Figure 5, there is only one data point out of ten data points in the intervention phase and reinstatement of intervention phase (81%) that is above the highest data point in the baseline phase (72.2%), creating a PND score of 10% (1/10).

Overall, the data showed that homework completion percentage decreased from 61.8% at baseline to 56.4% at intervention. This was an overall decrease of homework completion of -8.7% from baseline to intervention. The data showed that homework completion percentage very slightly increased from 56.4% at intervention to 56.8% at reinstatement of intervention. This was an overall increase of homework completion of 0.7% from intervention to reinstatement of intervention and decrease of -8.1% from baseline to reinstatement of intervention.
Accuracy Results

<table>
<thead>
<tr>
<th>Day</th>
<th>Percentage Correct (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>59</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
</tr>
<tr>
<td>3</td>
<td>71</td>
</tr>
<tr>
<td>4</td>
<td>85</td>
</tr>
<tr>
<td>5</td>
<td>64</td>
</tr>
</tbody>
</table>

*Average 65.8*

*Figure 6: Chart of Intervention Data for Student’s Math Homework Accuracy*

<table>
<thead>
<tr>
<th>Day</th>
<th>Percentage Correct (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>72</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
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<tr>
<td>3</td>
<td>56</td>
</tr>
<tr>
<td>4</td>
<td>69</td>
</tr>
<tr>
<td>5</td>
<td>48</td>
</tr>
</tbody>
</table>

*Average 59*

*Figure 7: Chart of Reinstatement of Intervention Data for Student’s Math Homework Accuracy*
The intervention data for student’s math homework accuracy was recorded (Appendix E). Intervention accuracy data was displayed in both chart (Figure 6) and graph (Figure 8) form. The data was collected in the classroom every morning as soon as the students entered the class and deposited their homework assignments. The results were recorded over a 10-day period, with ten slips of paper being put into the criterion “Goal For Today”. Five of the slips of paper measured homework completion, while the other five measured accuracy, to make up the ten days. Therefore depending on the slip of paper being drawn, the criterion for each day of intervention was random with five of the days over the 10-day period collecting data for completion and the other five measuring accuracy. Although baseline data was not recorded for homework accuracy, the BPSYC student felt it would be beneficial for the students and the thesis program to begin to record homework accuracy simultaneously when the intervention for homework completion began.

The intervention accuracy percentage data was collected using permanent product recording and indicated that the mean homework accuracy percentage for the students over the five days recorded was 65.8%. Figure 6 showed that over the five days that an accuracy criterion was drawn, that the lowest percentage achieved was 50% and the highest percentage
achieved was 85%. The trend line shown on Figure 6 showed a very slow and gradual increase in intervention homework accuracy percentage over the five-day period.

According to Tawney and Gast (1984), to consider the data stable, 80% or more of the data points would need to fall within 15% of the mean. The mean intervention homework accuracy percentage for the students was 65.8%. 15% above the mean would be 80.8% and 15% below the mean would be 50.8%. The intervention homework accuracy data results concluded that 80% (4/5) of the data points were within 15% above or below the mean of 65.8%. This indicated that the intervention homework accuracy data was in fact stable.

The data also indicated that homework accuracy percentage was initially measured at 65.8 % (as it was not recorded during the baseline phase).

**Accuracy- Reinstatement of Intervention**

The reinstatement of intervention data for student’s math homework accuracy was presented in both chart and graph form (Appendix E). The data was collected in the classroom every morning as soon as the students entered the class and deposited their homework assignments. The results were once again recorded over a 10-day period, with ten slips of paper being put into the criterion “Goal For Today”. Five of the slips of paper measured homework completion, while the other five measured accuracy, to make up the ten days. Therefore the criterion for each day of intervention was random with five of the days over the 10-day period collecting data for completion and the other five measuring accuracy.

Reinstatement of intervention accuracy data was displayed in both chart (Figure 7) and graph (Figure 8) form. The reinstatement of intervention accuracy percentage data was collected using permanent product recording and indicated that the mean homework completion percentage for the students over the five days recorded was 59%. Figure 7 showed that over the five days that a completion criterion was drawn, that the lowest percentage achieved was 48% and the highest percentage achieved was 72%. The trend line shown on Figure 8 showed a very slow and very gradual decrease in intervention homework completion percentage over the five-day period.

According to Tawney and Gast (1984), to consider the data stable, 80% or more of the data points would need to fall within 15% of the mean. The mean reinstatement of intervention homework accuracy percentage for the students was 59%. 15% above the mean would be 74% and 15% below the mean would be 44%. The reinstatement of intervention homework accuracy data results concluded that 100% (5/5) of the data points were within 15% above or below the mean of 59%. This indicated that the reinstatement of intervention homework accuracy data was in fact stable.
PEM and PND scores could not be calculated for homework accuracy percentages, as a baseline phase was not recorded for this measure.

The data also indicated that homework accuracy percentage decreased from 65.8 % at intervention to 59% at reinstatement of intervention. This was an overall decrease of homework accuracy of -10.3% from intervention to reinstatement of intervention.

**Mean Program Results**

<table>
<thead>
<tr>
<th>Phase of Program</th>
<th>Completion</th>
<th>Accuracy</th>
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</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>61.8%</td>
<td>Not Measured</td>
</tr>
<tr>
<td>Intervention</td>
<td>56.4%</td>
<td>65.8%</td>
</tr>
<tr>
<td>Reinstatement of Intervention</td>
<td>56.8%</td>
<td>59%</td>
</tr>
<tr>
<td>% Increase/ Decrease B To C</td>
<td>0.07%</td>
<td>-10.30%</td>
</tr>
</tbody>
</table>

**Figure 9:** Chart displaying Mean Results for Homework Completion and Accuracy for Each Phase of Program
**Figure 10**: Graph displaying Mean Results for Homework Completion and Accuracy for Each Phase of Program

The ‘A’ phase of the study was defined as baseline, the ‘B’ phase as intervention, and the ‘C’ phase was defined as the reinstatement of the intervention.

The mean results for homework completion and accuracy for each phase of the program was presented in both chart (Figure 9) and graph (Figure 10) form (Appendix F). Therefore, the results from the thesis study do not support the thesis statement stated in the Introduction section. The thesis statement that, a randomized interdependent group contingency combined with pre-selected reinforcers chosen at random, will have a positive effect on both the completion percentages of assigned math homework in grade 6, 7 and 8 students from a regular elementary school classroom, was not supported based on the interpreted results.
Chapter V: Discussion

Overview

In elementary schools today, homework is regularly assigned by teachers every night and is to be completed outside of the classroom. Many teachers and parents are concerned that a lack of homework completion has a negative effect on overall academic grades and productivity for students (Miller & Kelley, 1994). There is empirical support that has successfully made an association between homework completion and the positive success of students’ academics (Theodore, Dioguardi, Hughes, Aloiso, Carlo & Eccles, 2009). Rosenberg (1989) added that homework tasks that were completed both fully and correctly ended up being the most beneficial for elementary school students. This thesis program was designed to gather information and evidence to support the use of an interdependent class-wide group contingency with a randomized criterion and randomized rewards in order to increase the math homework completion of grade 6, 7, and 8 students.

Interpretation of Results

Completion

The data in Appendix D showed that homework completion percentage decreased from 61.8% at baseline to 56.4% at intervention. This was an overall decrease of homework completion of -8.7% from baseline to intervention. The data in Appendix D additionally indicated that homework completion percentage very slightly increased from 56.4% at intervention to 56.8% at reinstatement of intervention. This was an overall increase of homework completion of 0.7% from intervention to reinstatement of intervention.

Accuracy

The intervention data in Appendix E showed that homework accuracy percentage was initially measured at 65.8% (as it was not recorded during the baseline phase). The data also indicated that homework accuracy percentage decreased from 65.8% at intervention to 59% at reinstatement of intervention. This was an overall decrease of homework accuracy of -10.3% from intervention to reinstatement of intervention.

Mean Results

The concluding mean results of the thesis study found in Appendix F displayed that the program was not effective, as the data showed an overall decrease of -8.1% in homework completion rates (baseline to reinstatement of intervention) and a -10.3% decrease in homework accuracy percentage (intervention to reinstatement of intervention) of the grade 6, 7, and 8 students. The thesis program results do not support previous findings regarding class-wide group contingencies being effective when attempting to change the behaviour of all individuals in a
classroom setting simultaneously as first stated by Stage and Quiroz (1997). Overall, the evidence from the study appears to suggest certain factors of this specific intervention should be explored to understand why the treatment was not successful.

**Implications for the Behavioural Psychology Field**

The current study and its results provide contributions to the field of psychology, primarily the use of applied behavioural analysis in an elementary school classroom setting. Due to the time and ratio of teacher-to-student constraints, it appears much more practical to attempt to implement a group contingency in a classroom setting as opposed to an individual student program. Brantley and Webster (1993) stated that there has been an increase in behaviour analysts focusing their attention to group contingencies being used in school wide applications, as well as classrooms. Similarly, the study by Theodore et al. (2009), who demonstrated that an interdependent group contingency with reinforcers that had been randomized had a positive impact on both the completion and accuracy of the students spelling homework, produced the opposite effects as this program. Furthermore the results from the study do not replicate findings from Zins and Erchul (2002), who commented on how behaviour analysts who collaborated with teachers to design homework interventions had found the most success with classroom wide interventions in attempts to create a treatment plan to improve homework performance in elementary school settings.

**Limitations**

The nature this study used a single-subject design, limited the potential of the findings being generalized and additionally limited to only similar individuals as the students (age, school, subject etc.) in the study being presented.

The absence of homework accuracy rates being included in the baseline data was one of the most crucial limitations. However, homework accuracy was not originally intended to be collected during the program. It was added later as an extra measure in order to ensure that students were not rushing through the completion of their work and writing down random answers to the homework questions without actually taking the time to complete the work accurately. Had a low mean number for homework accuracy been present during the baseline phase of the program, perhaps more of a positive change in the data potentially may have been seen. Despite the mean scores from accuracy at intervention to accuracy at reinstatement of intervention decreasing by -10.3%, a low accuracy baseline number could have shown a slight possible positive increase between accuracy baseline and intervention mean scores.

Time was also a limitation in the study. If more time had been available for the BPSYC student to remain in the classroom while continuing to implement the program, more positive changes could have began to be seen.
The rewards that the students were able to earn were kept a mystery during the entire program. Some students may have thought that because the rewards were unknown, that they were not worth attempting to obtain. Also, it could be noted that if the program continued for an extended period of time, the criteria and the reinforcers in the jars were not changed over time, satiation may have occurred in the students and ultimately become a limiting factor.

Ceiling effects, the level at which the interdependent group contingency reinforcement no longer has effect on math homework completion and accuracy, could also be noted as a potential limitation. Some students may not have been able to show significant improvements between any phases of the study, as the students in the classroom represented a widespread range of different levels of academic and homework capabilities. Additionally, parental influence and family expectations may have been impacted the study, as homework patterns may have continued to be controlled by the student’s parents.

There was also potential for minimal risk for student distress with regard to peer pressure and competition between the students in the study. Additionally, problems may have arisen from students blaming others for the class not obtaining the reward, despite the results from each individual student being kept confidential, as only the collective class-wide result was shared.

Multilevel Challenges

Client Level: In the elementary school setting, it can be difficult to motivate students to participate and follow the guidelines of a new program. For instance, a student or students who are taking part in the behaviour program can feel as though they are being singled out when their behaviours are being observed, approached, and/or recorded. On the other hand, if a program is implemented as a group intervention, it is not necessarily designed with each individual in mind. An individual or a group at an elementary school level could wonder or challenge why a behavioural program is being developed for them or their class and not for any other students or classes. Furthermore, the other students in class or other classes in the school who notice a behavioural program is being run could instigate bullying behaviour on the target student(s) for being a part of it.

Program Level: For the counsellor/analyst in the elementary school setting, it can be a challenge keeping attention on and observing the student(s) they are developing and implementing their behavioural program for. This is because in a classroom environment there are many students and many tasks that need to be completed on a daily basis to keep the classroom momentum going. Additionally, it can be very difficult for a teacher to continue a behavioural program for a student or students on departure of the analyst, based upon the numerous amounts of tasks and time that need to be planned, focused on, and completed each day. This appears to be one of the major limitations of both a single student and/or a classroom-wide based behavioural intervention program. A group contingency would appear to be much
more practical for a classroom as opposed to individual student treatment programs for this same reason.

**Organizational Level:** Based on the amount of work that a teacher is responsible for completing on a daily basis, as well as the amount of students greatly outnumbering the teacher ratio wise, it can be difficult for the teacher to provide the one-on-one attention needed by many students who are struggling. Each student has different circumstances in their lives and each requires different needs and approaches in order to maximize student success. Classroom-wide teaching and learning approaches are often implemented and changed in order to increase learning and help assist as many kids as possible, however some students fall between the cracks and are not given the help they need based on their personal situations and perspectives.

**Societal Level:** Other staff members at an elementary school, parents, or society in general may view a behaviour analyst in a school as a waste of time and/ or money. For instance, many may believe that taxpayers money is being wasted on this position, as the results are not instant or do not always find 100% success. Other staff may view this position as a waste of time, as they do not believe in the applied behaviour analysis frame of mind or they do not believe that the amount time being spent on a single student as beneficial. Many view the job as unnecessary and stand behind the notion that student behaviour and overall success is strictly the responsibility of the teacher. However, in reality it is perhaps the opposite. With so many students and only one teacher or adult in the classroom (because of an increased cut of funding in order to save money for supplies which are also being regularly cut), it is eliminating the chance for students who are struggling with behavioural difficulties and academic success, to be granted the help they desperately require. Failing to support these students that are struggling has an impact on society down the line, as these students will not have received the skills necessary to be successful in high school and may not be adequately prepared to attend post-secondary education.

**Recommendations for Future Research**

The purpose of this study was to investigate the effectiveness of an interdependent class-wide group contingency with a randomized criterion and randomized rewards in order to increase the math homework completion and accuracy of grade 6, 7, and 8 students. Although the evidence from the classroom-based procedures used in this investigation did not show promising results, the experiment was time-efficient, cost-effective, and easy to implement, which could be seen as motivating for both teachers and their students. Therefore it is recommended that school based personnel remain educated regarding evidence-based programs created to not only improve homework performance, but all classroom-wide interventions that are teacher-friendly and are designed to improve overall student success on a daily basis.

Future research should be conducted using similar components of this study across different age ranges, subject areas, school settings, and populations, while keeping this studies
limitations in mind. A recommendation can also be made that it is important over time to alter both the criterion and rewards in order to avoid predictability of the goals being drawn each day and the satiation of the rewards that are regularly obtained. Reinforcement would eventually have to be changed to a variable schedule. Specifically this could be accomplished by adding blank pieces of paper into the “Reward Earned” jar, in order to attempt to fade out the reinforcement while still maintaining the student’s homework behaviour. Upon the departure of the BPSYC student, the classroom teacher could attempt to continue the program, but only complete the draw and record the homework data once a week on a random day, due to the amount of work the teacher already has to complete on a daily basis and the unsuccessfulness of the original program. Additionally, if the teacher were to continue the program occasionally, follow-up data on the homework completion and accuracy rates would be valuable to examine over a further extended period of time throughout the elementary school year. Although ceiling effects were present in this thesis study due to different academic abilities in the classroom and may have impacted the class average data, it still remains beneficial for all students to participate. This is because all of the students able to practice new scholastic material and also acquire the non-academic positive compensations and long-term benefits of homework completion.

In summary, if homework productivity and quality could effectively be enhanced using a similar method, it could potentially lead to greater academic achievement along with additional non-academic everyday benefits for all students in a classroom atmosphere. While there is support for the use of classroom-wide group contingencies, this particular application at an interdependent group contingency using randomized criteria and reinforcers was unsuccessful in increasing homework completion and accuracy rates.
References


APPENDIX A
Functional Assessment & Preference Assessment Survey

Math Homework Survey- Grade 6, 7, 8

Circle as many answers for each question as apply to you.

1) Which of the following statements do you find to be the most accurate about you the student completing your math homework?

a) The math homework is way too hard

b) The math homework is always too easy

c) The math homework is the just the right amount

d) There is always too much math homework

e) I do not have enough time each night to complete my math homework

f) There is a lack of positive or negative consequences for completing my math homework (so what’s the point of even doing it?)

2) Which of the following rewards do you feel would positively motivate you to complete your math homework every night?

a) A longer gym period or educational games (“Kahoots”) time

b) A longer “free time” period to access your devices everyday/computers

c) A movie on a Friday afternoon

d) Candy/Treats/Food

e) “No Homework Pass” for one night

f) Other Ideas: __________________________________________________________
Student Responses

1) Which of the following statements do you find to be the most accurate about you the student completing your math homework?

<table>
<thead>
<tr>
<th>Statement</th>
<th>Number</th>
</tr>
</thead>
<tbody>
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<td>Too Hard</td>
<td>2</td>
</tr>
<tr>
<td>Too Easy</td>
<td>7</td>
</tr>
<tr>
<td>Just Right</td>
<td>13</td>
</tr>
<tr>
<td>Too Much</td>
<td>2</td>
</tr>
<tr>
<td>Not Enough Time</td>
<td>1</td>
</tr>
<tr>
<td>No Consequences</td>
<td>1</td>
</tr>
</tbody>
</table>

2) Which of the following rewards do you feel would positively motivate you to complete your math homework every night?

<table>
<thead>
<tr>
<th>Reward</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gym/ Games</td>
<td>12</td>
</tr>
<tr>
<td>Longer &quot;Free Time&quot; on Devices</td>
<td>6</td>
</tr>
<tr>
<td>Movie on a Friday afternoon</td>
<td>13</td>
</tr>
<tr>
<td>Treats/Food</td>
<td>16</td>
</tr>
<tr>
<td>&quot;No Homework Pass&quot; for 1 night</td>
<td>9</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
</tr>
</tbody>
</table>
APPENDIX B

Consent Form

Informed Consent For Participation In Class Research Study

Dear parent(s)/guardian(s):

Project Title: An applied behavioural analysis program to increase math homework completion and performance in grade 6, 7 and 8 students.
Principal Investigator (Student): Brady Faroldi
Supervisor: Michelle Holloway
Institution: St. Lawrence College

Invitation
Your child is being invited to take part in a research study. I am a student in my 4th year of the Behavioural Psychology program at St. Lawrence College. I am currently on placement at Holsgrove Public School. As a part of this placement, I am completing a research project (called an applied thesis). I would like to ask you for your child’s help to complete this project. The information in this form will help you understand my project. Please read the information carefully and ask all the questions you might have before you decide if you want your child take part.

Why is this study being done?
An association can be made with homework completion and the positive success of student’s academics. This study is being completed as a way to help your child complete their homework more regularly while also increasing their overall homework performance.

What will your child need to do if s/he takes part?
If you choose to allow your child to take part in this study s/he will be asked to complete their math homework regularly each night. Every morning their homework will be collected and marked based on completion and accuracy of questions completed. The data will be recorded and the homework will then be returned to the students. This process will continue for approximately two months.

What are the potential benefits to your child if they take part?
Potential benefits of taking part in this research study may include your child demonstrating an overall increase in homework completion and performance, which can potentially translate to an improvement in academic success at school.

What are the potential benefits of this research study to others?
The potential benefits of this research study to others may include positive peer interactions and teamwork taking place between all students in the classroom.

What are the potential disadvantages or risks to my child if they take part?
There is potential for minimal risk with regard to peer pressure, slight distress and competition between the students in the study. Additionally, problems can arise from students blaming others for the class not obtaining the reward, however the results from each individual student will be kept confidential and will not be shared as a class, only the collective class-wide result.

**What happens if something goes wrong?**
If any of these mentioned minimal risk situations do occur, your child’s teacher will intervene as necessary and needed through means of talking about and creating a solution with the student(s) involved in the problem.

Every individual is different. If your child decides not to complete their homework on any night during the study, they will not receive any form of penalty related to the program. Should your child feel the need for any reason to speak further with myself their classroom teacher or myself regarding their current experience or any questions/concerns they have, they may do so at any time.

**Will the information you collect from my child in this project be kept private?**
All of the information recorded that identifies your child, will be kept strictly confidential. No names or identifiers will be used during the study. Your child will be assigned a student code number during the program. The consent forms, my project notes, and all recorded data will be kept in a locked filing cabinet at Holsgrove Public School. The computer files with the study data will be kept in a password protected file on a secure, password-protected computer. All study documents and results will be kept securely for 10 years at Holsgrove Public School, and then will be destroyed. Your child’s name or other identifiers will not be used any reports, publications, or presentations resulting from this project.

**Does my child have to take part?**
Taking part is voluntary. It is up to you to decide whether or not allow your child to take part. I will also ask your child if they want to take part. If you decide to allow your child take part, you will be asked to sign this consent form. If you do decide to allow your child to take part in this project, you and/or your child are still free to stop at any time, without giving any reason, and without experiencing any penalty, or negative effects. If your child decides to stop taking part, please have them let their classroom teacher or myself know.

**Contact for further information**
The Research Ethics Board at St. Lawrence College has reviewed this project. Michelle Holloway, my supervisor from St. Lawrence College, helped me develop this project. I appreciate your help and the help from your child. If you have any additional questions, feel free to ask me, Brady Faroldi (BFaroldi29@sl.on.ca). You can also contact my College Supervisor, Michelle Holloway (MHolloway@sl.on.ca) or you may also contact the St. Lawrence College Research Ethics Board at reb@sl.on.ca.

**Consent**
If you agree to allow your child to take part in this research project, please complete the following form and return it to me as soon as possible. A copy of this signed document will be given to you for your own records. We will keep an additional copy of your consent form at Holsgrove Public School.

By signing this form, I agree that:

- The study has been explained to me.
- All my questions were answered.
- Possible harm and discomforts and possible benefits to my child of this study have been explained to me.
- I understand that my child has the right not to participate and the right to stop at any time.
- I am free now, and in the future, to ask any questions I have about the study.
- I have been told that my child’s personal information will be kept confidential.
- I understand that no information that would identify my child will be released or printed without asking me first.
- I understand that I will receive a signed copy of this consent form.
- I understand that the data from this study will be presented at the St. Lawrence College Behavioural Psychology Poster Gala, and may be reported at other conferences or published in a scientific journal. No identifying information will be included in these reports.

I hereby consent for my child, ________________ to take part.

Parent/Guardian Name
Signature of Parent/Guardian
Date

Student Printed Name
Signature of Student
Date
APPENDIX C
Baseline Data for Student’s Math Homework Completion

<table>
<thead>
<tr>
<th>Day</th>
<th>Percentage Completed (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>72.7</td>
</tr>
<tr>
<td>2</td>
<td>72.7</td>
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<tr>
<td>3</td>
<td>63.6</td>
</tr>
<tr>
<td>4</td>
<td>59.1</td>
</tr>
<tr>
<td>5</td>
<td>65.4</td>
</tr>
<tr>
<td>6</td>
<td>50</td>
</tr>
<tr>
<td>7</td>
<td>57.7</td>
</tr>
<tr>
<td>8</td>
<td>61.5</td>
</tr>
<tr>
<td>9</td>
<td>61.5</td>
</tr>
<tr>
<td>10</td>
<td>53.8</td>
</tr>
</tbody>
</table>

Average 61.8

**Figure 1:** Chart of Baseline Data for Student’s Math Homework Completion

**Figure 2:** Graph of Baseline Data for Student’s Math Homework Completion
APPENDIX D
Homework Completion Percentage Data for All Phases of Program

<table>
<thead>
<tr>
<th>Day</th>
<th>Percentage Completed (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>52</td>
</tr>
<tr>
<td>2</td>
<td>40</td>
</tr>
<tr>
<td>3</td>
<td>81</td>
</tr>
<tr>
<td>4</td>
<td>41</td>
</tr>
<tr>
<td>5</td>
<td>68</td>
</tr>
</tbody>
</table>

Average 56.4

Figure 3: Chart of Intervention Data for Student’s Math Homework Completion

<table>
<thead>
<tr>
<th>Day</th>
<th>Percentage Completed (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>70</td>
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<tr>
<td>2</td>
<td>61</td>
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<tr>
<td>3</td>
<td>42</td>
</tr>
<tr>
<td>4</td>
<td>63</td>
</tr>
<tr>
<td>5</td>
<td>48</td>
</tr>
</tbody>
</table>

Average 56.8

Figure 4: Chart of Reinstatement of Intervention Data for Student’s Math Homework Completion
Figure 5: Graph of Homework Completion Percentage Data for All Phases of Program
**APPENDIX E**

Homework Accuracy Percentage Data for All Phases of Program

<table>
<thead>
<tr>
<th>Day</th>
<th>Percentage Correct (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>59</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
</tr>
<tr>
<td>3</td>
<td>71</td>
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<tr>
<td>4</td>
<td>85</td>
</tr>
<tr>
<td>5</td>
<td>64</td>
</tr>
</tbody>
</table>

**Average** 65.8

*Figure 6: Chart of Intervention Data for Student’s Math Homework Accuracy*

<table>
<thead>
<tr>
<th>Day</th>
<th>Percentage Correct (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>72</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
</tr>
<tr>
<td>3</td>
<td>56</td>
</tr>
<tr>
<td>4</td>
<td>69</td>
</tr>
<tr>
<td>5</td>
<td>48</td>
</tr>
</tbody>
</table>

**Average** 59

*Figure 7: Chart of Reinstatement of Intervention Data for Student’s Math Homework Accuracy*
**Figure 8:** Graph of Homework Accuracy Percentage Data for Intervention and Reinstatement of Intervention Phases of Program
APPENDIX F

Mean Results for Homework Completion and Accuracy for Each Phase of Program

<table>
<thead>
<tr>
<th>Phase of Program</th>
<th>Completion</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>61.8%</td>
<td>Not Measured</td>
</tr>
<tr>
<td>Intervention</td>
<td>56.4%</td>
<td>65.8%</td>
</tr>
<tr>
<td>Reinstatement of Intervention</td>
<td>56.8%</td>
<td>59%</td>
</tr>
</tbody>
</table>

**Figure 9:** Chart displaying Mean Results for Homework Completion and Accuracy for Each Phase of Program

**Figure 10:** Graph displaying Mean Results for Homework Completion and Accuracy for Each Phase of Program