

A Comparison of Homework Practices in an Adolescent Mathematics Classroom

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## **Abstract**

Homework is an integral part of any successful classroom. It is important for educators to be cognizant of which homework practice will be most effective and efficient for their students. This allows the educator to make better decisions regarding other aspects of their classroom including planning, pacing, and curriculum, among other things. This project compares two different homework practices employed in an adolescent mathematics classroom. While there is no significant difference in performance for either method, the benefits of both are discussed.

## Chapter 1

### Problem Statement and Significance of the Problem

Educators who assign homework should strive to make assignments as beneficial to all students as possible. To the chagrin of most students, homework should be an integral part of the classroom, as it can be used in a variety of ways: (1) to further student understanding; (2) to allow for student exploration; and (3) to provide an opportunity to practice important skills that are subsequently important. Gill and Schlossman (2003) publicized homework as a way for students to build their academics and character, while also promoting America's international competitiveness.

Whether teaching in a small rural school, i.e. with 65-75 students per grade level, or in a large city school, homework in a mathematics classroom can have an extremely positive impact on your day-to-day classroom environment. When given substantial thought by the teacher to create meaningful homework, homework can provide valuable information to both students and teachers alike, which will in turn shape the daily activities of the classroom.

In many classrooms, homework is defined as any schoolwork that the student is assigned to complete outside of class. This schoolwork can consist of practice problems for skill building, lab activities, concept exploration or creation of study materials. Some educators may employ a "flipped classroom" in which homework would consist of completing the notes outside of class practice the next class day (Bergman and Sams, 2012).

Often, homework is assigned three or four times per week, where it is expected that each assignment should require approximately fifteen to twenty minutes to complete. An appropriate

amount of time for homework for high school students is two hours (VanVoorhis, 2004). For example, if high school students have approximately six classes and if each teacher assigns twenty minutes of homework in their class, then the student would have two hours of homework that night.

Sometimes the students have special needs, rendering, it extremely important that homework is designed to meet any necessary content goals while not becoming too laborious for students. In situations where students have special needs, educators must ensure that appropriate accommodations are in place in order for the students to have the ability to achieve success on the given assignment.

The goal of this research is to consider efficient and effective homework practices to be employed in mathematics classrooms.

## **Methods**

The research examined two specific homework practices and compared student achievement scores for a high school Non-Regents Geometry class. Non-Regents Geometry is a class that was created as an alternate pathway after Integrated Algebra. The students who are in Non-Regents Geometry have struggled throughout their middle school and high school years in mathematics and are recommended for the course by their Integrated Algebra teacher with consultation from the guidance counselor and middle school mathematics teachers. Consequently, many students in a Non-Regents Geometry class have Individual Education Plans (IEPs) or receive services due to Section 504 of the Rehabilitation Act (504 Plans). While a Non-Regents Geometry course consists of much of the same material as the Regents Geometry course, it does not delve deeply into certain topics such as proofs.

In this research, achievement scores are defined as the scores earned from weekly quizzes given in class. Although there is no New York State Exam for a non-Regents level course, utilized assessments may be created from a variety of resources, including textbooks, online workbooks, and the New York State Regents Exam in Geometry, of which all are based upon the New York State Standards.

In particular with the Non-Regents Geometry class, homework is an important tool in skill-building because some students struggle to retain skills and concepts from previously learned material. Thus homework assignments may be used as a way to help students develop conceptual and procedural understanding of mathematics. It is typical for some homework to include problems that have been modeled in class. Homework assignments should help students retain skills and concepts since students are given another opportunity to be exposed to content before coming to the next day's class.

### **Definition of Terms**

Throughout the remainder of this thesis, the following will be referred to as Homework Practice #1:

At the beginning of each class, the previous night's homework was checked by the teacher for effort and completeness. Students received a grade out of a total of four points based on the effort shown on their homework assignment. The teacher may provide comments based on observations. Also, students were asked which problems they found particularly challenging and the teacher made note of those problems. Afterwards, each problem from the assignment was reviewed on the SmartBoard in varying detail. Students were able to see the correct process and

answer for each problem. Students were given the opportunity to ask questions about each problem and, if necessary, an additional similar example may be completed to scaffold students in their pursuit of understanding.

Throughout the remainder of this thesis, the following will be referred to as Homework Practice #2:

Upon arriving in class, the students hand-in the previous night's homework assignment to the teacher. After class, the teacher checked each student's homework assignment for effort, completeness, and correctness. As the assignment was being checked, the teacher also wrote comments on the assignment. The comments were positive and advised the students in the problem solving process. The teacher made note of problems on the assignment that appeared to be particularly challenging to the students, and identified any common misconceptions.

Additionally, as students entered class, the previous day's homework assignment was passed back to the students. After receiving their previous homework assignment, the students were given approximately three to five minutes to review the previous homework assignment and teacher comments. Afterwards, the students were given the opportunity to ask any questions they may have on the homework assignment. Any misconceptions the teacher noticed were addressed in further detail. If necessary, additional practice problems were completed to clear up any misconceptions the students may have.

## **Rationale for Research of the Two Homework Practices**

With Homework Practice #1, students receive feedback on a daily basis on their homework assignments. The feedback, however, is typically brief. In a period-style school system, educators do not have an opportunity to give students an extensive amount of individual feedback on their homework assignments during class time. With class periods that typically ranging from 40 to 44 minutes in length, there is not enough time available to give individualized feedback to each student while still being able to cover the necessary material on a daily basis. Teachers may be able to give students a few quick tips while checking the homework assignment but it is their hope that when each individual question is gone over, the students are able to recognize any mistakes they made or are able to clear any misconceptions they may have had. With Homework Practice #1, however, educators are at the mercy of their students to speak up if they continue to have misconceptions after a specific homework problem is gone over. It can be very difficult for high school students to ask questions in front of their classmates, especially for students who may lack interest and confidence in mathematics to begin with. Unfortunately, if the students need additional individual support that cannot be given during class meeting time, they need to spend time coming in during one of their free periods, if they have any, or stay after school for the extra support. It can be difficult for teachers to persuade students to spend their free time after school working on a subject that they may not enjoy.

Homework Practice #2 allows for individualized student feedback on a daily basis. Through the provided feedback, students are able to more easily see any misconceptions they may have with a particular skill or topic. However, with Homework Practice #2, students are not

able to see as many homework problems completed on the SmartBoard each day. The students must rely on the teacher feedback to improve, and thus, a high quality of feedback is required.

### **Summary**

Homework is an important piece of any classroom. It provides the students with an opportunity to build their skills and further their understanding of the topics in class, while also providing the teacher with an opportunity to assess their students' learning and design their curriculum going forward. It is not a task that should be taken lightly because when it is well-designed it can be an extremely important tool to facilitate student learning.

## **Chapter 2**

### **Introduction**

Homework is a widely used teaching technique but also one that is especially controversial (Wildman, 1968). Students in this day and age are overburdened with extracurricular activities such as athletics, play rehearsals, band practice, volunteer work, jobs, and friendships (Kitsis, 2008). With all of these things, and others, going on, it is easy to see why even the most dedicated students can dislike homework. There are just not enough hours in the day for students to do all the activities they want, while still being able to focus on their studies, as important as the homework can be to a student's education.

It has been found that homework plays a critical long-term role in the development of children's' achievement motivation (Bempechat, 2004). The difficult part for educators is creating assignments that will help foster this development of our students.

In creating these assignments, educators must know the purpose behind their homework. Homework is assigned, by most teachers, for at least one of the following ten purposes: practice, preparation, participation, personal development, parent-teacher communication, parent-child relations, peer interactions, policy, public relations, and punishment. These purposes serve three main functions for educators: instructional, communicative, and political (Van Voorhis, 2004).

The most common purpose for assigning homework is practice. Teachers want their students practicing the skill learned in class that day in order to help master that skill, as well aid in preparing the student for the next upcoming lesson (Cooper, 2001). This is especially

prevalent in the content of mathematics. With topics and skills building upon previously learned topics and skills, it is important that students are given the opportunity to practice and master the skill before moving forward. Utilizing homework as practice time helps to allow the unit progression flow more easily as, ideally, the next day's class time can be used to move on to the next topic.

Also, homework may provide a chance for students to more easily participate and show an understanding of their learning. In the ever-growing diversity of our classrooms, homework can provide students who may not enjoy speaking up in overcrowded class the opportunity to demonstrate their learning of a topic or skill. The homework assignment gives all students an opportunity to individually participate in their learning.

Many educators also utilize homework for character-building purposes (Gill and Schlossman, 2003). Homework assignments can give children the opportunity they need in order to develop attitudes about achievement and study habits that will aid in their learning. Surveys have found that both elementary and secondary teachers say that they assign homework in order to foster study and time management skills (Bempechat, 2004). Through homework, students learn the importance of effort and the ability to deal with mistakes and difficulty. Using homework as a tool in this way causes us to look beyond the short-term achievement grades of our students and focus more on the development of skills that students will take with them beyond their schooling.

Additionally, many teachers assign homework either because they have to or because they think they have to (Van Voorhis, 2004). In some districts, homework is used to show

parents that the school has rigorous academic expectations and standards. While some schools have strict homework policies that detail that homework duration, frequency and procedures, 65% of districts do not have such established policies (Bryan and Burstein, 2004). In these districts that do not have established policies, some teachers may feel pressured to assign homework. It is generally accepted that teachers will assign homework and it is possible that when one does not assign homework there could be public outcry from parents whose children will be soon entering an ever-competitive job market. Some educators may give assignments only because they fear they will receive incredible backlash from the school community about their class being too easy otherwise (Coutts, 2004).

However, since this individual research is centered on the effect of different homework practices on the achievement of students, let's focus on that for a moment. There has been plenty of research to show that academic achievement is positively related to completion of homework (Cooper, Lindsey, Nye, and Greathouse, 1998). Also, research has shown that, regardless of a student's ability or previous coursework, the amount of time the student devotes to homework will increase their achievement (Keith and Cool, 1992). Academic excellence requires students to invest effort into their studies and time spent on homework is a gauge of such effort (Gill and Schlossman, 2003).

This is where homework can become troublesome for some teachers. Many educators that have the opportunity to work with students with special needs on a daily basis are not certified in special education. Although some aspects of homework are consistent across all students, there are more issues that may arise when working with special education students, who may have very individualized educational needs.

According to Bryan and Burstein, 2004, students with learning disabilities find the road to homework completion covered with potholes from start to finish, and their deficits become more problematic with age. These potholes can severely hinder the educational of experience of students who are as interested in their own learning just as much as general education students are.

Special education wants to be just as successful as general education students but, in most cases, have to work much harder to achieve that. Their measures of success will be different than that of most general education students but they deserve the right to have the opportunity to have the best opportunity to meet those goals.

Fifty-six percent of students with learning disabilities and 28% of students without learning disabilities have problems completing homework assignments (Polloway, Epstein, and Foley, 1992). For special education students these difficulties arise from their disabilities. These difficulties can include lack of motivation and poor attitudes with these difficulties being attributed to personal deficits such as short attention span, memory insufficiencies, poor receptive language, and/or lack of organizational skills (Bryan and Burstein, 2004).

Some of these notions can handcuff a well-designed homework assignment as soon as it is assigned. For example, listening and memory deficits could possibly hinder knowing or remembering what is assigned. Additionally, issues with organization are likely to affect whether or not the assignment is brought homework to complete and then, subsequently, brought back to school to turn in.

Some steps can be taken to help limit the effect that these difficulties will have on students and their homework completion. It is good practice even when students do not have listening or memory issues to always write the homework assignment somewhere in the room, preferably in a consistent and predictable spot. Additionally, employing use of a daily agenda for students to records assignments in will also alleviate some of the possible issues.

For students with organizational problems, a homework folder can be used to help organize the materials that will be needed in order to complete the given assignment. Before leaving school, the students can check a singular folder, allowing them to focus on fewer things, to ensure they have the assignment to complete.

Assuming that the homework actually makes its way home to be completed, another set of problems can begin to occur for students with special needs. At this point, students may encounter difficulty completing the assignment due to lack of motivation, short attention span or memory deficits. It has been generally accepted that two hours of homework per night is an appropriate amount for high school students (Van Voorhis, 2004). How does this work within the realm of students with special needs who may deal with the aforementioned deficits?

Ask a group of students what they dislike most about homework and they are likely to respond with “it takes up too much time” (Van Voorhis, 2004). When students with special needs are involved, this can become even more problematic. Due to varying degrees of individualized deficits, it is likely impossible to create one blanket assignment for all students in a classroom. In an inclusive setting, homework assignments that may take general education students two hours to complete could possibly take a student with special needs upwards of four

hours to complete. The same is true in reverse as well. Assignments that may take a student with special needs two hours to complete may only take a general education student forty-five minutes to complete. It is important that teachers are able to meet the needs of all students in their classrooms.

In order to do this, this likely means that educators will have to modify their homework assignments for some students in order to meet their individual educational needs. These modifications, in most cases, will alter the length of assignments but modifications that alter the content of these assignments should also be considered. Modifications can aid in creating a more positive homework experience for students with special needs.

While modifying the length of homework assignments can be extremely beneficial for students, modifying the content may help to alleviate some of the issues that students with special needs may encounter on their homework. A survey of teachers of students with learning disabilities found that eighty percent of teachers regularly assigned homework but few matched the tasks to students' skills and provided feedback or positive consequences for homework performance (Salend and Schliff, 1989). For example, many students with special needs struggle with the motivation necessary to complete homework assignments. If a teacher is able to modify their homework assignment to create problems geared more towards the interests of a particular student, then it is possibly more likely that that student will at least attempt to complete that homework assignment if they find it relatable to their own life. Then, since, as stated before, homework completion has been linked to achievement, the student will theoretically achieve at higher levels.

In modifying homework assignments for students with special needs, teachers must be aware of the need to hold those students to appropriately high standards. Depending on the class, learning goals may be more flexible than others. In courses that have a culminating state examination, it is important that, even though modifications are being made to materials, the assignments are rigorous enough to prepare students for those state exams. This may mean that assignments may need to build in difficulty in order to allow students to reach the necessary level of skill. Many districts have the benefit of offering high school courses with Regents Exams over the course of two years, which allows for additional time to be spent on building skills that will be used in future material.

Another way to improve the learning experiences of students with special needs is involving parents in homework assignments. In general, parents see the benefits of homework mostly as achievement-related where homework leads to a better chance of success on classwork and, also, helps to promote attitudes and habits that lead to more successful student learning (Coutts, 2004). It has been found by researchers that homework is positively affected by parental involvement (Sawyer, Nelson, Jayanthi, Bursuck and Epstein, 1996). Parents can take on a role that fosters student independence at completing homework. Students are more likely to achieve homework success if parents are able to create an environment conducive to student learning. This environment may include provided materials to complete the homework, monitoring student performance, monitoring other after-school activities, or providing incentives for homework completion. Taking these steps helps to show students that education is valued in their homes (Bempechat, 2004).

However, before parents can become involved in the process, a clearly communicated homework policy must be established (Marzano, Pickering, and Pollock, 2001). Both students and parents, alike, need to be aware of aspects of this policy including the purposes of homework, how much homework will be assigned, the consequences for not completing the homework, and also a description of the types of parental involvement that are acceptable. The establishment and communication of these policies will go a long way in easing potential tension among teachers, students and parents on homework. Also, following these policies after they have been established will increase the chance that the homework assignments will increase student achievement.

Another aspect of homework completion that parents need to be aware of while helping provide a positive environment for their children to complete their homework is the homework styles of their children. For example, some students may be comfortable doing their homework on the floor with the lights down low. It is not uncommon that that child's parents may, at least, think, if not, encourage their child that he may be better off working at a desk with the lights on (Hong, Milgram, and Rowell, 2004). Parents interviewed on the homework styles of their children admitted to their past efforts to alter their child's way of doing homework (Hong, Tomoff, Wozniak, Carter, and Topham, 2000). It is important that parents do not assume that certain conditions will provide the best learning environment for their own children. They need to be open to their child's preferences for completing their homework and try to meet those preferences accordingly. In school, the student is typically forced to learn in a way determined by their teacher, but when they are at home working on their homework they should be able to choose a learning style that suits them best (Hong, Milgram, and Rowell, 2004). In allowing

students to complete homework in a way that is comfortable to them, it increases their motivation to complete the homework, as well as, likely increases their level of understanding of the skills and material, which in turn will likely increase student achievement. Some students actually complete their homework in their preferred ways, but for most there is a gap between what they prefer and what they actually do (Hong and Milgram, 1999). When the gap is greater between preferred learning conditions and actually learning conditions, the achievement of the student is lower (Hong, Milgram, and Rowell, 2004). Teachers, parents and students should work together to determine and learn more about the individual differences in learning styles in order to find a style that works best for each individual student.

Unfortunately, encouraging parental involvement can also be a detriment to students as not all homes are conducive for student learning (Wildman, 1968). Research has shown that a lack of positive effect of homework on achievement scores may also be tied to the student's parents' negative attitudes (Bempechat, 2004). Parents play an extremely important role in shaping the views of their children. If they do not value education, it is not hard to imagine that their children will not either. Parents' negative attitudes about education and homework may possibly come from a negative experience of their own, but also from the notion that family life may be disrupted by nightly homework (Wildman, 1968). Some parents may believe that after their children have put in a "long day" at school when their children are tired, it is time for them to spend their remaining free time with their family. This can, obviously, put a strain on parent-teacher relationships, as well as parent-child relationships.

Another negative of parental involvement is parental over-involvement. In order for parental involvement to benefit the student, as stated before, the parent must know the limits of

their involvement. The goal of homework is to further the learning of students and that does not happen if a parent completes the homework for their child. There must be established boundaries for parents to work with their students on their assignments.

While the aforementioned tips on homework completion can be beneficial for students with special needs and general education students. At its core, an effective homework assignment must be well-designed. When homework assignments are well designed, they will (a) link to topics and skills in the curriculum, (b) receive feedback from the teacher (i.e., check for completion, comments, grades), and (c) be a student's responsibility to complete (Epstein and Van Voorhis, 2002). Homework is too often completed alone and not discussed in class or meaningfully commented on by the instructor (Kitsis, 2008).

Obviously, feedback to students is an important aspect of any classroom (Siewart, 2011). The feedback provided to students must provide information specifically relating to a task or process of learning (Hattie and Timperly, 2007). There are a variety of ways in which feedback can be provided to students with some ways being more effective than others. Feedback can potentially be confirming whether a student's response is right or wrong, pointing a student in the right direction, or signifying that there may be an alternative approach to understanding a particular task among other things. The important thing is that the feedback is provided in some learning context.

Feedback can be both verbal and written. Verbal feedback is immediate feedback. It does not require much of the teacher's time. It can, however, be difficult to ensure that verbal feedback is meaningful because it will not seem sincere to students if the teacher says "Good

job!” or “Well done!” to every student in the room (Siewart, 2011). Verbal feedback tends to have minimal effect on student retention of information, although, it has been shown that an incorrect answer that was corrected with verbal feedback will most likely be answered correctly later (Bangert-Drowns, 1991).

Written feedback requires much more of the teacher’s time and attention. It should be used to inform students that they have successfully recalled information about a particular concept. Written feedback should be more specific and geared toward the student’s process of answering the question. The quality of teacher’s written feedback greatly affects student learning. It has been shown that less specific comments written on student work have been less productive in enhancing student understanding (Matsumura, Patthey-Chavez, Valdes, and Garnier, 2002). Surface level corrections in written feedback do little to improve the overall content of the assignment.

However, an interesting aspect of feedback is that it can be accepted, modified or outright rejected (Kulhavy, 1977). The feedback educators provide to their students may not have the ability to spark further action of their students. Therefore, while feedback may be important, it may not always be a reinforcer in the way that a teacher would intend it to be. Effective feedback must contain information that a student can use (Brookhart, 2008). If the student cannot understand the feedback given, it will deem the feedback useless and potentially disregard it.

Feedback can have an extremely positive or negative impact on the self-esteem of our students. Any type of teacher feedback can potentially be viewed as being critical of our

students and their effort on a particular assignment (Siewart, 2011). This can be especially challenging with students with special needs. It is important to frame feedback in as positive of a manner as possible for these students. Obviously, it is necessary to provide corrective feedback for all students but do so in a way that will also accentuate a positive aspect of the student's work. This will, hopefully, keep the students motivated to continue their learning while also providing for that learning to improve.

One of the difficult notions of teacher feedback is decided how much feedback to provide. It is important, and often difficult, that teachers do not try to "fix" everything that you see (Brookhart, 2008). Consider the overall learning goals that you would like your student to reach and focus on those first. Provide specific feedback that will help students reach those learning targets but remember to also be positive. As stated before, the choices on what you make to write as feedback which has a tremendous impact on how the student interprets the feedback given to them. It is important to consider the student's perspective when choosing your feedback to them.

Additionally, students want feedback on their assignments (Cushman, 2010). If students are spending their time after school on assignments, they want those assignments to feel meaningful. Teacher feedback of those assignments meets that need. Some students feel that without feedback, the assignment was meaningless. Students also feel that practicing something wrong continuously on homework assignments because of not receiving feedback is far worse than making no effort at all to complete the assignment.

Homework is an integral part of a classroom. It is one feature of a classroom that affects students, teachers and parents. While steps can be taken by teachers and parents to increase the effectiveness of homework, students must also share in the responsibility of making homework an effective piece of the classroom (Sawyer, Nelson, Jayanthi, Bursuck, and Epstein, 1996). Parents and teachers can collaborate to help create positive homework experiences but it is students who have to complete the assignments. It is also the students who have to use the provided feedback to help further their understanding.

## **Chapter 3**

### **Introduction**

The purpose of this particular research was to further investigate which homework practice may be the most effective, efficient and favorable inside the mathematics classroom. Through the analysis of data collected from two different school years, 2010-2011 and 2011-2012, the goal was determine which of two selected homework practices, if either, had a more positive effect on the achievement scores of students in an upstate NY high school mathematics classroom. From there, after conducting the analysis, the results may help shape the homework procedures within other mathematics classrooms.

Students from two different school years were used because there are not multiple sections of Non-Regents Geometry each year. The student make-up of the Non-Regents Geometry classes from year to year is very consistent. As mentioned before, the students in this class have been recommended based on their previous experiences in mathematics courses and on standardized tests. For each of the two years of classes examined in this study, the students' grades on the Integrated Algebra Regents Exam ranged from 65% to 77% and all students scored 3 or below on their 6<sup>th</sup>, 7<sup>th</sup> and 8<sup>th</sup> grade New York State Mathematics Assessments.

### **Participants**

The participants in this research were sophomores and juniors at small, rural school in Upstate New York who were enrolled in a Non-Regents Geometry course in 2010-2011 and 2011-2012. In the 2010-2011 class, there were a total of fifteen students, with nine females and

six males. There were seven juniors and eight sophomores in the class. This class consisted of fourteen Caucasian students and one Asian student. Most of the students are from similar socioeconomic statuses ranging from lower class to upper-middle class. This particular class had five students with Individualized Educational Programs (IEP's) or 504 plans. Additionally, there was only one student who needed their homework assignments modified on a daily basis. Homework assignments were modified in length, as this particular student was given a lesser number of the same problems given to their classmates. The 2010-2011 class was not co-taught with a special education teacher. It did, however, have a support staff member who was present to assist both the teacher and the students in a variety of capacities including note-taking and classroom management.

In the 2011-2012 class, there was a total of eighteen students in the class, with nine males and nine females. Seven of the students were juniors and eleven of the students were sophomores. This class consisted of sixteen Caucasian students, one refugee student from Sierra Leone and one student from Latin America. Most of the students were from similar socioeconomic statuses ranging from lower class to upper-middle class. However, one of the most important characteristics of this class is the high volume of students with Individualized Educational Programs (IEP's) and 504 Plans. Of the eighteen students in this class, thirteen of the students had IEP's or 504 Plans. Due to this, this class was co-taught with a special education consultant teacher. The IEP's and 504 Plans were in place for a variety of issues including hearing impairment, Attention Deficit Disorder, Attention Deficit Hyperactivity Disorder, Asperger's Syndrome and various other learning disabilities.

In particular, the student with Asperger's Syndrome was in his first year without a one-to-one aide. In the past, the one-to-one aide had helped with his organization and redirection of

his focus throughout each class period. With that lacking in addition to the high volume of students with special needs in his class, it had been, at times, extremely difficult to keep him actively engaged and productive in the activity being completed in class.

The characteristics of these students not only lead to an extremely wide range of ability levels within the class but also a wide time frame for how long it took students to complete both in-class and homework assignments. For the intents and purposes of this action research project, the more important implication is the degree in which homework assignments must be modified. On a daily basis, at least three “different” homework assignments were assigned to the students in this class.

### **Procedures of Study**

The data used for this research was collected in November 2010 and November 2011. Since the research being done in this study was to determine if a change in homework practices would result in higher achievement of students, weekly quiz performance scores were chosen to be used as the data to compare. In order to do the analysis, the quizzes taken by each class were extremely similar, if not exactly the same.

The 2010-2011 class employed the aforementioned Homework Practice #1, where their homework was checked at the beginning of class for effort and completeness with limited individual feedback. The 2011-2012 class employed Homework Practice #2, in which their homework was collected each day, graded for effort and completeness, and returned with comments written on specific homework questions. .

To aid in determining if there was a link between the change in homework practice and student achievement, also collected was one week's quiz scores for the students' in the 2011-2012 class using Homework Practice #1 to compare with the 2010-2011 class' corresponding quiz scores. This particular data would help me to determine the causational factors for any mean score differences if they should arrive.

## Chapter 4

### Results

By examining the make-ups of each class, one may possibly expect that the 2010-2011 class would have higher performance scores on the quizzes compared to the 2011-2012 class, due to the fact that the 2011-2012 class was made up of more IEP and 504 students. This, however, would prove to not be the case.

For the results of the quizzes, see Table 1 below. The reader should make note of the differences in mean scores, median scores and modal scores for each of the quizzes. While there is no statistically significant mean difference between the 2010 and 2011 quiz scores when using an independent T-test, the scores from 2011 are slightly higher than the 2010 scores.

Table 1

Quiz	2010 Quiz Scores		2011 Quiz Scores	
	Mean	Standard Deviation	Mean	Standard Deviation
1.4	21.1	4.7	23.5	4.8
1.5	16.9	2.9	16.9	2.5
1.6	24.5	4.3	27.1	4
1.7	14.7	4.1	17.7	3

## Conclusions and Recommendations

Although each of the mean quiz scores for the 2011-2012 class were higher than or equal to each one of the corresponding mean quiz scores for the 2010-2011 class, after running a two sample t-test on each of the corresponding quizzes, the test revealed that there was not a significant statistical difference between the mean scores for both Quiz 1.4 and Quiz 1.5. There was, however, a significant statistical difference between the mean scores of Quiz 1.6 and Quiz 1.7. One may assume that this could be related to the change in homework practice, but it should be noted that, of the two quizzes, only Quiz 1.6 was taken while the different homework procedures were in place. For Quiz 1.7, both classes employed Homework Practice #1.

Based on the results of the four t-tests, one would be unable to conclude that the change in homework practice had a significant effect on the performance of students on the quizzes compared across the two years. Moreover, due to the fact that the mean quiz scores were not statistically significantly different for two of the quizzes in which the alternative homework practice was employed and the quiz in which the students from both classes employed the same homework practice showed a statistically significantly different mean quiz score, one could conclude that the difference in mean quiz scores was due to random chance and not because of the change in homework practice.

Coming at the data from another direction, one may be able to conclude that the students were unable to reap the rewards of Homework Practice #2 until the third week of the study. It is possible that the students became more comfortable with the new practice and the first two weeks of the study laid a solid foundation to build their skills upon for the third week of material.

This is a possible explanation as the third week's material was a continuation of some of the skills learned and developed in week one and week two of the research. The same could be said concerning the material studied during the week in which both classes had employed the same homework practice. The fourth week of instruction was the culmination of the unit and it utilized a number of skills learned from the previous three weeks' instruction, often times combining two or more of the previous learned skills.

Although unable to conclude that the change in homework practice had a statistically significant effect on the performance of the students, educators should note many positives from this research. The students seemed to appreciate the additional, more individualized feedback they received on each homework assignment. This is something that educators and students, alike, can find to be extremely beneficial for the students. Additionally, Homework Practice #2 allows educators to more easily get a better awareness of the level of understanding of the students in their class. By collecting and grading each homework assignment, educators are able to see which topics their students have a firm grasp on and which topics may require additional teaching before continuing on. This leads to an improvement in planning and preparation for the upcoming day or days' instruction, as the educator will have a better idea of their students' levels of understanding.

Along with these positives, there are also some negative aspects of the change in homework practice. One possible negative is that the students may not like having to wait a day before going over the homework assignment they turned in. Many students may want to immediately go over the homework assignment, especially if they are accustomed to Homework Practice #1. Students like appreciate the fact that any questions they had could be immediately

answered the day that the homework was due. Additionally, even though there would only be a day between handing in the homework assignments and going over them, some students may forgot their thought process for a specific problem.

Another negative to this change in homework practice is the additional work it creates for the teacher involved. Depending on the number of students involved, Homework Practice #2 could potentially add a great deal of additional work to an educator's day. In this homework practice for just one class of eighteen students, it added an average of approximately sixty minutes of work to the researcher's day. Although that amount of "extra" work is not that great for a single class, if this practice were applied to an additional five classes, it would obviously add up to a great deal of necessary additional time to be spent on a daily basis.

When questioned which homework practice they preferred, the students were undecided. Homework Practice #1 had positive aspects not found in Homework Practice #2 and vice-versa. The nature of these two homework practices makes it extremely difficult to combine them into something the students would like while not compromising the grade given on homework assignments. If the practices were combined and each homework question was gone over on the same day as the homework assignment is due, it would be very easy for students to complete any unfinished questions as they are gone over before having to hand in the homework assignment, meaning that if students are graded on effort and completeness, all students would "earn" full credit on every homework assignment.

The goal of educators should be to give their students the best chance to succeed, not only inside of their classroom, but also outside of their classroom. To achieve this goal,

educators must know what their students do well and what they need to improve upon.

Homework Practice #2 gives allows educators to be more cognizant of the levels of understanding of their students, which is an integral piece of meeting the aforementioned goal.

Homework Practice #2 gives teachers another great opportunity to gauge the understanding levels of their students and make any necessary and appropriate changes to their instructional plans going forward.

Before making any decisions on the homework procedures of their classroom, educators should take into consideration their own thoughts and beliefs of homework, in addition to considering which type of homework procedure may be more beneficial to their students. There are a variety of other homework practices that could be used including random problem checks, collecting random problems, and trading and grading homework assignments with a fellow classmate. It may be unrealistic to utilize all of the aforementioned homework practices in one class during a particular school year, to determine which practice may be best, but if the situation presented itself, the research could be done by applying a different homework practice to different sections of the same course.

It is extremely important for educators to continue to improve and evolve throughout their careers. Educators need to take a deeper look at not only their homework practices, but also other aspects of their profession including instructional techniques and curriculum. By continuously improving and evolving the facets of their craft, educators will, hopefully, be increasing the chances of their students to be successful, both, inside and outside of their classrooms. To aid in doing this, teachers should seek out advice from their fellow educators in

order to gather ideas and advice that could be applied to their classroom. Their colleagues may be able to provide them with a number of new techniques and procedures.

In conclusion, although unable to conclude that the change in homework practice had a statistically significant effect on the performance of the students, Homework Practice #2 should be recommended to any teacher interested that can handle the additional time requirements, since this practice, certainly, did not have a negative effect on the performance of students and may allow educators to get a better idea of the levels of understanding of their students on a more frequent basis. Homework Practice #2 had benefits that, in terms of allowing educators to meet their primary goal, arguably, outweigh the drawbacks. After all, decisions made in the classroom should benefit students the most.

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