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The Effect of Homework on Summative Assessments

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The Effect of Homework on Summative Assessments

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Northwestern College

An Action Research Project Presented
in Partial Fulfillment of the Requirements
For the Degree of Master of Education

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Abstract

The purpose of this action research study was to determine if homework completion had an effect on how students performed on summative assessments. This action research study was conducted in a high school classroom in Northwest Iowa. An Algebra and Algebra 2 class were used during this research process. Quantitative data was collected on homework completion and summative assessment scores for three consecutive chapters covered in each respective class. The results of this study showed while there is a positive correlation between the two variables, no significant conclusions could be made from the collected data.

Keywords: homework, motivation, summative assessments

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The Effect of Homework on Summative Assessments

Introduction

For over 100 years, homework has been a controversial subject (Strauss, 2003). Teachers, students, and parents have opinions about homework, specifically regarding how much should be given and whether it should be graded or not. Each school system is familiar with these issues because “as each school year gets underway and expectations regarding homework unfold, teachers and administrators are fitfully confronted by parents irritated by the struggles and complaints of their children with homework” (McLeod, 2017, p. 45). Within the United States, schools have started to make the decision to opt out of assigning homework. However, Heffernan (2019) argues homework should not be eliminated, but “demand smarter ways to use homework”. Instead of being a burden to those currently within the educational system, homework should be designed to help positively impact student achievement. “If schools are to lay the conundrum of homework to rest, it would behoove them to repeatedly state its intended purpose: to fortify the understanding and learning of students” (McLeod, 2017, p. 46).

The issue regarding homework is whether it helps our students deepen their learning and understanding, and whether it has a positive impact on their performance on assessments. In an article describing the case for and against homework, Marzano and Pickering (2007) synthesize Harris Cooper's research by stating “if a district or school discards homework altogether...it will be throwing away a powerful instructional tool”. Cooper and his colleagues found “the average student in a class in which appropriate homework was assigned would score 23 percentile points higher on tests of the knowledge addressed in class than the average student in a class in which homework was not assigned” (Marzano & Pickering, 2007). Voorhees (2011, p. 363) states in her article “there is a positive relationship between the amount of homework students do and their academic achievement” while also adding teachers need to ask themselves “how can we improve the quality of homework assigned so it is doable and effective”. This research enforces the idea homework can be beneficial to students and their performance on assessments.

While there has been research done on student motivation and academic achievement, there seems to be a gap in studies done looking at how homework completion can affect performance on assessments.

The purpose of this action research project will be to look more closely at the relationship between homework completion and student performance on summative assessments. The two main research questions will drive this study are the following: do students who complete their homework regularly perform better on summative assessments and does grading assignments encourage students to complete their homework more often. In doing this research, the desire is to have concrete results can be used to help improve the practices regarding homework amongst teachers, specifically within my current math department. This action research presents an opportunity for discussion and future collaboration within school districts on their homework policies and how to effectively use it to enhance student learning.

For this action research, the literature review will be composed of articles found using scholarly websites. The main sources for this research came from Northwestern's DeWitt online library database and Education Resources Information Center (ERIC) website. The articles selected were peer-reviewed and most were published within the last ten years, with the exception being Harris Cooper's research. Cooper has done extensive research on homework, specifically regarding its effectiveness, when it is the most beneficial for students within their education career and has set guidelines for how much homework should be given at different grade levels.

Review of the Literature

Purpose of Homework

There are several reasons for and ways teachers use homework within their classrooms. According to Baş, Şentürk, and Ciğerci's (2017) meta-analytic research on homework, "these purposes can be classified into instructional and non-instructional purposes" (p. 32). These authors describe the following instructional purpose:

1. To provide students with opportunities for practicing, reviewing, or reinforcing the material already presented in the class, and determining whether students have understood the lesson and/or have obtained desired skills.
2. To introduce new material to be presented by the teacher and help students to get the benefit while the new material is introduced in the class.
3. To provide students with an opportunity to apply and integrate previously learned skills to new situations and/or other interest areas.
4. To create occasions for students to use different resources like the Internet, library, reference books, etc.
5. To enable students to use their own skills and abilities to produce creative and individualized products. (Baş, Şentürk, and Ciğerci, 2017, p. 32)

In addition to these instructional purposes, they also provide examples of non-instructional purposes which include the ability "to establish and improve communication between parents and children about homework's importance for learning" and "to help students acquire responsibility, self-confidence and self-discipline" (Baş, Şentürk, and Ciğerci, 2017, p. 32).

In 1986, Harris Cooper received a grant from the National Science Foundation to complete additional research on homework and summarize the findings. According to the summary, Cooper (1989) states "homework assignments can be short or long" and "they can have different purposes" (p. 87). Cooper (1989) adds examples of these purposes to include "practice of old material, introduction of new

material, integration of skills, or extension of the curriculum” (p. 87). These findings coincide with what Baş, Şentürk, and Cığerci (2017) state in their research. Another purpose of homework given in Cooper’s analysis is for assignments to “be tailored for individual students or entire classes” as well as being designed “to be completed by individuals or as group projects” (Cooper, 1989, p. 87). Additionally, “supporters contend homework encourages independent learning, promotes responsibility as well as good work and study habits, and ultimately supports students in developing the character traits necessary for success in life” (McLeod, 2017, p. 45). Many teachers assign homework with the intention of improving student understanding and proficiency over concepts recently taught in the classroom.

“One of the major arguments of those who oppose homework is it is busywork and does not serve any real purpose” (McGlynn and Kelly, 2019 p. 36). According to Heffernan (2019), “in the United States, there is an ongoing debate about whether homework is worthwhile, with critics saying it’s busywork at best and at worst, its detrimental to student learning” (p. 80.). Homework should be used to provide students with the opportunity to obtain mastery over concepts they have been learning. For teachers to combat this argument, it is necessary to state the objective before giving an assignment so students know what the purpose is (McGlynn and Kelly, 2019 p. 36). According to McGlynn and Kelly (2019), “it is challenging to find motivation to complete an assignment if you do not know the reasoning behind why you are doing it” (p. 36), which is why teachers must be diligent in explaining the purpose behind assignments.

Another aspect in the purpose of homework is what the role of assignments should be. In a study conducted by Burriss and Snead (2017), middle school students were surveyed about the perceived role of homework. Each student was asked a variety of questions about why homework was assigned, who makes teachers assign homework, how is homework graded, and several others. According to Burriss and Snead’s (2017) findings, “some students believe homework is designed to support their learning” while other “students are not convinced of the learning benefit of homework” (p. 203). Also, Burriss and Snead (2017) state “some students’ narratives described homework assignments as preparing them for high school, nurturing their overall thinking, and helping them to retain information” while adding “these

students indicated a belief they are in control of their learning and, through homework, they can assume responsibility toward improving their knowledge” (p. 203). These findings align with what both Cooper (1989) and Baş, Şentürk, and Ciğerci (2017) stated on why homework is assigned.

However, Burriss and Snead also indicate “a large number of students described their completing homework as ‘busywork’” (p. 203). Findings showed “other students described homework as irrelevant, arbitrary, and punitive” (Burriss and Snead, 2017, p. 203). The researchers specifically discuss concerns about students reporting homework is used as a punishment. Burriss and Snead (2017) add “any instructional strategy associates learning as punishment does not nurture students’ emerging sense of responsibility” and “assuming responsibility for individual learning is crucial toward an understanding of mastery and not mere performance” (p. 203-204). This conclusion supports the findings of both McGlynn and Kelly (2019) and Heffernan (2019). Teachers need to understand “practice and review are not punishment, but are required as lifelong learning strategies, hopefully recognized as students develop an understanding of their unique abilities” (Burriss and Snead, 2017, p. 204).

Tam and Chan (2016) also conducted a study dedicated to the purpose of homework. The study looked at Chinese primary school teachers in Hong Kong regarding teacher perceptions about homework and its use within classrooms. Tam and Chan (2016) collected data from 317 teachers but had a focus group involved 38 of the original participants (p. 29). Based off the findings, “focus group participants cited a host of academic and nonacademic functions fulfilled by doing homework” (p. 33). According to Tam and Chan (2016), “learning functions mentioned included consolidating and monitoring learning and preparing for assessment” (p. 33). Results from the focus group interviews also included “nonacademic aspects, namely facilitating personal development, enhancing home–school communication, and serving as punishment for misbehaviors” (P. 33). In the findings of this research, one teacher spoke specifically of how homework is used to monitor student learning progress by stating “when students work on assignments are related to the lessons, they realize how much they have learned” while also adding “sometimes students think they know the materials, but when they go home and work on the assignments, they find out they don’t quite understand” (Tam and Chan, 2016, p. 34). Tam and Chan’s (2016) research

reinforces the idea teachers assign homework to students to provide an opportunity to practice newly learned concepts and can monitor progress. In addition to these ideas, another teacher from this study stated the following:

As part of their process of learning, students need to understand the purposes behind doing homework. Teachers do not assign homework simply to fill up students' free time. The purposes of homework are very important. You learn something, and then there is a follow-up assignment. This is the process of learning. If students understand this point, they will hold a different view on homework. (Tam and Chan, 2016, p. 34)

This research supports the argument McGlynn and Kelly (2019) made when discussing why the purpose of a homework assignment should be clearly explained to students. Another important finding from Tam and Chan's (2016) research is "doing homework was considered contributive to personal growth" (p. 35). A teacher shared in her interview "students do homework to build up knowledge. At the same time, homework helps students to develop independence and confidence" (Tam and Chan, 2016, p. 35). In addition, the findings stated, "the use of homework as a form of punishment was mentioned in the interviews but is on the whole considered inappropriate and ineffective" (Tam and Chan, 2016, p. 35). Their findings concur with the research of Burriss and Snead (2017). Overall, homework can serve many different purposes within the educational system, but it is important teachers explain these to students for it to become a more effective practice.

Effects of Homework

In Cooper's (1989) synthesis of research, several positive and negative effects were derived from assigning homework. Some of the positive reasons outlined include better retention of factual knowledge, increased understanding, curriculum enrichment, improved attitude toward school, better study habits and skills, greater self-discipline, better time organization and several others (p. 86). According to Cooper (1989), one of the most obvious positive effects of homework is "it will have an immediate impact on the retention and understanding of the material it covers" (p. 86). In 2006, Cooper, et al. published findings after evaluating research had been done in the United States since 1987 on the effects of homework. The

results “found 69 correlations between homework and achievement reported in 32 documents” and “fifty correlations were in a positive direction and 19 in a negative direction” (Cooper, et al., 2006, p. 48). It is also stated “five studies presented correlations between the amount of time students spent doing homework and student attitudes revealed a significant positive relationship” (Cooper, et al., 2006, p. 51). From this research, it can be argued homework can have a positive effect on how students perform academically.

Looking more closely at this idea, a separate study was conducted by Trussell and Dietz (2003) on the effects of graded homework and how students performed in a preparatory math course were studied. In the research, two sections of the same course were compared, with data collected, once in a spring semester and repeated in the following fall semester. “The students were treated the same and questions were answered in the same manner” (Trussell and Dietz, 2003, p. 142), but one section had graded homework while the other were given the same assignments but were not receiving a completion grade. The same exams were given to the students in both sections. According to results from the first semester’s experiment, “the model predicts a student in the graded homework section will have a test total almost 20 points higher than comparable students in the ungraded section” (Trussell and Dietz, 2003, p. 143). These results support the conclusions of Cooper, et al. (2006).

In both sets of experiments, “the differences favored the section with graded homework” (p. 142). However, when Trussell and Dietz (2003) repeated the experiment in the fall semester, the overall results did not match what was previously found: “the two sections did not differ significantly in the second experiment” and “not only did the section variable not have the significance it did in the first experiment, but also no other variables except CUMGPA were significant in the second experiment” (Trussell and Dietz, 2003, p. 144). The authors state “after the first semester, we might have concluded grading homework helped students perform better on tests. However, there were several other factors may have contributed to the difference in performance” (Trussell and Dietz, 2003, p. 143). This “two semester experiment on the effectiveness of grading homework produced inconsistent outcomes” and “there are several possible explanations for the fact the second time the experiment was done graded homework was

not a significant factor in the determination of the students' performances" (Trussell and Dietz, 2003, p. 145). This research suggests homework doesn't always have the positive effect on student performance educators believe should exist.

These results are consistent with what Cooper (1989) found to be negative effects of homework. In contrast to the listed several positive effects, the synthesis of research included negative effects, such as loss of interest in academic material, physical and emotional fatigue, confusion of instructional techniques, copying from other students, and many others (p. 86). According to Cooper (1989), educators worry "homework could lead to satiation effects" and "any activity can remain rewarding for only so long" (p. 87). The effects of homework on different grade levels have shown it "has substantial positive effects on the achievement of high school students" while "junior high students also benefit from homework but only about half as much" and "for elementary students the effect of homework on achievement is trivial, if it exists at all" (Cooper, 1989, p. 89). When Cooper, et al. (2006) conducted research on homework, some of the results remained consistent with Cooper's (1989) research findings. In 2006, "this analysis still showed a higher correlation for secondary than for elementary school students" (Cooper, et al., 2006, p. 50). Elementary students "are less able than older children to ignore irrelevant information or stimulation in their environment" which led the authors to believe "the distractions present in a young student's home environment would make home study less effective for them than for older students" (Cooper, et al., 2006, p. 50). Therefore, homework tends to have more positive effects on older students rather than younger students. Cooper concluded "within reason, the more homework high school students do, the better their achievement" (1989, p. 89).

Parental Involvement

While most students are highly influenced by peers, several studies have been done on how parental involvement affects student homework completion and academic achievement. In a study performed by Núñez et al. (2015) which looked at over 1600 Spanish students, it was found "students' perceptions of their parents' homework involvement were related significantly with their homework behaviors" (p. 394). In summary, the findings support the idea parental homework support benefited

children's academic achievement by providing both positive and motivational resources could be extended into the school day. Núñez et al (2015) also states "these students [were] more intrinsically motivated to homework and show persistence when coping with challenging situations" (p. 395). Based on this study, parental involvement in student homework can have highly positive effects on academic achievement.

Natriello and McDill (1986) found comparable results. This research focused on twenty public secondary schools and how performance standards of parents and teachers influenced student effort on homework and academic achievement. Findings showed teachers and peers can be guilty of sorting individuals into general categories based on levels of competence within different areas at school and will assign differing roles to students based on interpretations of those students. However, "parents, unlike teachers and peers, are locked into long-term relationships with their children" (Natriello and McDill, 1986, p. 28); therefore, parents are better able to understand where children may struggle within school and provide different support systems to help with those difficulties. In most situations, parents know children's strengths and weaknesses better than any other adult within a child's life, so decisions can be made at home could support academic goals.

In contrast to this belief, some students do not have a supportive home environment and therefore do not receive needed support. In cases where students are not receiving academic support at home, "it is well known motivation and academic emotions tend to decline over time if nothing is done to sustain them" and "research has shown teachers play a key role in supporting child motivation" (Moè, et al., 2018, p. 337). These researchers did two separate studies on how parent autonomy-supportive scaffolding effects children's motivation, self-efficacy, and engagement. In the first study, 122 parents and respective children were used, while the second study focused on 37 parents chosen from the first study. The findings state "studies on the role of parents have been less common and have also produced contrasting results" (Moè et al., 2018, p. 337). Cooper (1989) extends on this idea. Cooper found there are times parents can be a negative influence on children's achievement by causing confusion if using a different instructional method or interfering with children's learning by taking over the assignment (p. 87).

According to a study done by Pino-Pasternak (2014), both sides of this argument had merit. This researcher observed nine families and their interactions while working through a reading passage and solving two-word math problems. Differing reactions from parents based on how children responded to the problems were discovered. Some parents provided “children with sufficient time to elaborate and engage with their ideas” while some “readily reacted to their children’s unwillingness to engage in the tasks, increasing the use of intrusive control” (Pino-Pasternak, 2014, p. 368-369). Pino-Pasternak (2014) concluded parents have a significant impact on how children react to different situations and can either motivate or deter from their potential. For parents, it is important to understand the purpose of homework assignments and secure the resources needed to help scaffold children with appropriate motivation.

Online Vs Traditional Homework

The COVID-19 pandemic led to an increase in teachers using online platforms to deliver homework to students. Some researchers have examined how effective this practice is and if virtual delivery is an avenue to be pursued more often by current educators. In a study done by Roschelle, et al. (2016), the researchers looked at how the state of Maine is using a program called “ASSISTments” to deliver online homework assignments to students in middle school. It was found “achievement was higher in the schools used the online homework intervention” (Roschelle, et al., 2016, p. 8) compared to those who were doing traditional pen-and-paper homework. Additionally, lower-performing students benefited more from using this online program. One of the main benefits found from using this program was it “provided students with personalized feedback and hints immediately” (Roschelle, et al., 2016, p. 10). The researchers concluded this program was especially helpful to those students doing mathematics homework because it provided interventions are needed by many students today.

In a similar study, Balta, et al. (2018) incorporated the use of Socrative, an online homework platform, within a college classroom and compared how those students did to a control group completed traditional homework assignments. From the research, it was concluded “students were more committed with their exams when Socrative was used as an online homework platform” and this technology had “a positive effects on the teaching and learning of students” within this study (Balta, et al., 2018, p. 846-

847). However, there wasn't a significant difference in how students performed overall on the final exam. According to these studies, using an online platform can be encouraging to students who need immediate feedback on performance, but it may not always correlate to higher academic achievement.

Jonsdottir, et al. (2017) performed a similar experiment on an Introductory Statistics course where a control group was given traditional pen-and-paper homework while the other group used a web-based homework approach. The research included both quantitative and qualitative results. Overall, "the difference between web-based homework and pen-and-paper homework groups was found to be significant ... indicating students did better after handing in web-based homework than pen-and-paper homework" (Jonsdottir, et al., 2017, p. 18). Additionally, the response from the student surveys regarding the use of web-based homework was positive. Ninety percent of the students surveyed stated using the online system increased learning. However, 80% of the students surveyed preferred a combination of web-based homework and pen-and-paper homework versus only one specific type (Jonsdottir, et al., 2017, p. 17).

As a whole, these three studies showed using an online platform to assign homework provides many benefits to students but doesn't necessarily replace the traditional pen-and-paper model. Based off the results, it would be wise for educators to consider including an online homework platform where students can receive immediate feedback to assist in future practice.

Student Motivation

There are two major types of motivation, intrinsic and extrinsic, which influence how students feel and perform academically. Along with these two main types, students are also influenced by factors such as self-esteem and social influences. In a study done looking at how student motivation compared to the alignment of teacher beliefs, Wiesman (2012) stated "low self-esteem will affect motivation, school performance, and students' ability to focus on their studies and complete school tasks" and "adolescents want and need social approval and therefore, are highly motivated to develop close, reciprocal friendships" (p. 104). Adolescents are easily influenced by many factors and "are most often influenced

not by what their peers actually do and say, but how they think their peers will react to a potential action” (Wiesman, 2012, p. 104).

Research has also been done on what personally drives students to want to complete homework assignments. According to Afzal and Ali (2010), “effective learning in the classroom depends on the teacher’s ability which creates interest related to subject matter” (p. 84). In Afzal and Ali’s research, 342 university students within different programs were provided with a questionnaire asked about personal motivation within university study (p. 82). From this research, a positive relationship between student’s motivation and academic performance was found. In addition to this, it was concluded students who are more internally motivated tend to perform better and the better students perform, the higher the level of motivation becomes (Afzal and Ali, 2010, p. 84).

“Intrinsically motivated students keenly engage themselves in learning out of oddity, interest, or enjoyment, or in order to achieve their own scholarly and personal goals” (Afzal and Ali, 2010, p. 81). Students who are intrinsically motivated typically do not need a reward or an incentive to complete an assigned task. According to Wiesman (2012), “two major influences on students’ intrinsic motivation is their individual interest, which is a child’s inherent desire to learn certain concepts, and situational interest, which are environmental factors generate interest” and “teachers can increase a student’s situational interest when they make content personally relevant, allow for student choice, incorporate various instructional activities, and allow students to work in cooperative groups” (p. 105). For students who are not particularly intrinsically motivated, it is important for teachers to “promote situational interest by using innovative techniques to introduce new concepts or by providing real-world applications” (Wiesman, 2012, p. 105). In Afzal and Ali’s (2010) study, it was concluded “students who are intrinsically motivated perform much better academically than students who are extrinsically motivated” (p. 84). Intrinsic motivation has shown to be a powerful tool for students when it comes to academic performance; educators need to include ways to develop this type of motivation within students.

Tracking systems is another factor in student motivation. A study was done on how students placed within the different tracking systems in schools perform compared to other students in other tracks,

and how it impacted effort and academic achievement. Carbonaro (2005) studied 8th-10th graders placed in different tracks and how their impacted performance. Carbonaro (2005) found “the higher a student’s track, the more effort she or he exerts” (p. 43) and students tend to perform based on preconceived ideas about past results. Students who are placed in higher tracks tend to be more intrinsically motivated, positively effecting academic achievement. However, tracking can also be detrimental to students because of preconceived opinions about personal abilities as well as comparing academic capabilities with peers. It is crucial for students who are placed in tracking systems are aware of personal potential and are still being pushed to find the intrinsic motivation to reach individual goals.

Extrinsic motivation is more commonly found within students. “The extrinsically motivated student engaged in learning purely for attaining a reward or for avoiding some punishment” (Afzal and Ali, 2010, p. 81). A study done by Stocco, et al. (2021) supports this idea behind extrinsic motivation. A study was performed looking at the reasons why children lie about homework completion. It was found “lying in academic contexts may be maintained by escape from academic tasks or access to preferred activities” (Stocco, et al., 2021, p. 629). In relation to Stocco, et al. (2021) findings, Katz, et al. (2014) performed a study comparing motivation, self-efficacy, and homework procrastination by examining 171 fifth graders attending four elementary schools located in middle/high SES suburban neighborhoods (p. 113). The researchers found “students’ self-efficacy influences the type of motivation, which in turn influences the level of procrastination” and “students who are higher on autonomous motivation procrastinate more when they are less self-effacious” (Katz, et al., 2014, p. 116). In addition, “the study’s findings suggest than an emphasis on helping students to develop a more adaptive type of motivation towards an academic task could reduce negative consequences and support positive consequences” (Katz, et al., 2014, p. 117).

The differences in the varying types of motivation have also been researched. In 2018, Regueiro and several other researchers studied the different motivational profiles in high school students: 714 students, aged between 12 and 16. One of the major findings was “when analyzing goals, it is necessary to take into account the different profiles found and not just study students’ goals independently

considered” (Regueiro, et al., 2018, p. 455). Educators need to be aware of the diverse types of motivation existing within our students to better decide how to assign homework, have homework be completed, and whether it should be awarded credit or not.

In support of this idea, Cosio and Williamson (2019) looked at how the timing of completing homework impacted student performance in a General Chemistry class. The major finding was there is no way to ignore the fact there is a significant impact on how well students perform when completing assignments shortly after the lesson was taught. The researchers state “students who completed their homework before the next lecture had significantly higher exam scores than those who took more than four days to complete their homework” (Cosio and Williamson, 2019, p. 530). From this study, student motivation to complete assignments and academic performance are directly related. The key takeaway here is educators need to be finding ways to motivate students to complete assignments in a timely fashion to improve academic performance.

Planchard et al. (2015) examined how grading assignments within a college genetic course affected student motivation. According to the findings, “the relationship between homework and academic achievement established at the K-12 level also holds true at the college level” (Planchard et al., 2015, p. 16). Additionally, “most students were motivated to complete homework because they want to learn the course material and earn credit” and “even students who are motivated by reinforcement are more likely to complete credit assignments than non-graded assignments” (Planchard et al., 2015, p. 16). This research supports the idea homework should be graded to improve student motivation on completing assignments. However, Afzal and Ali (2010) state “extrinsically motivated students might do a good job or perform well to achieve a certain reward, but it does not keep them motivated for the long-term and overall performance does not change or is consistent” (p. 84). Whereas many teachers grade homework to encourage students to complete the assignments, this research shows this extrinsic reward won't necessarily sustain motivation for long periods of time.

After reading the research on student motivation and how it affects homework completion, this research project is designed to further investigate what motivates students to complete assignments and

how homework completion will impact performance on assessments. This action research project looked specifically at how grading homework impacts completion of assignments, and how completion of assignments affects performance on summative assessments. The researcher looked for any correlation between grading homework and completion, and homework completion's influence on academic achievement.

Methods

Research Questions

The purpose of this action research was to study the effect homework completion had on student performance on summative assessments. The main research question which inspired this action research is do students who complete homework regularly perform better on summative assessments. From this research, math teachers will be able to make conclusions about the relationship between homework and assessments given in the classroom.

Setting and Participants

This action research study took place in a high school mathematics classroom located in Northwest Iowa. The subjects used for this research were Algebra and Algebra 2. The high school this was conducted in has a student population of 597 students, while the district has a population of 2,232 students. The district consists of three elementary buildings, a middle school, and a high school. Algebra consisted of 9th graders while Algebra 2 had mainly 11th graders with a few 12th graders.

For this action research, one Algebra and one Algebra 2 class was used as the selection to compare data. The Algebra class had 22 students. 10 were male while the other 12 were female. From this class, no students were on IEP's or 504s. This class did have 2 ELL students, one who was a progressing Level 3 while the other was a progressing Level 2 student. The Algebra 2 class consisted of 16 students. Of these students, 7 were male while 9 were female. From this class, there was one student who was on a 504 plan and no students from the ELL program.

Research Design

For both subjects, students were given an assignment after the conclusion of each section. Students were given class time to work on the assignment, encouraged to ask questions, and were required to submit work onto the district's online learning management system, Schoology. Using Schoology allowed the researcher to keep track of which students were completing the assignments and was then able to make record in the grading system, PowerSchool. Schoology was also a way to provide feedback to students on homework, which in turn allowed the student to see the comments and gave an opportunity to ask for more clarification or request additional help.

For the Algebra class, homework was not graded. Students were given short formative assessments after the assignment was given, and students were allowed to use homework on these if it had been completed. These formative assessments contained 1-4 questions related to the material covered in class. For Algebra 2, homework was graded and entered into the gradebook with a numerical score. Students were given traditional quizzes about halfway through each chapter. For this action research, only the test scores were looked at when evaluating whether the homework completion had an effect or not. This action research used quantitative data to derive its results. The quantitative data was based on how often students completed homework and what the summative assessment scores looked like.

Variables

The independent variable for this research was the completion of homework. Student's completion of homework was monitored using Schoology. Submissions through Schoology allowed for tracking of completed assignments for data collecting purposes. PowerSchool, the gradebook system, was also used to keep track of the homework assignments given and completed. The dependent variable for this research was the summative assessment scores. Tests were looked at and compared between the classes to see how students performed and what affect the homework had on it.

Intervention

The intervention tested during this action research project was to see how completing homework assignments affected the scores on summative assessment. In addition to this, looking at the effect grading homework has on homework completion was also done. The homework assignments given were designed to provide practice for students learning new concepts. At the end of each chapter, the homework completion rate was analyzed with summative test scores to see if students who had a higher homework completion rate also performed better on the assessment. The number of students completing homework from both Algebra and Algebra 2 was also looked at to determine if grading the assignments provided additional motivation for the Algebra 2 students in comparison to the Algebra students.

Data Collection Plan

This research was completed over a 9-week period. During these 9 weeks, three chapters were covered in each class. During each chapter, assignments were given after a new section was completed. Students were provided with at least 15 minutes of in-class work time, and some specific class periods were designated as “workdays” to provide students with ample time to work on assignments. Students were then required to submit work onto Schoology. In Schoology, there was a designated folder for each chapter. Within the chapter folder, submission boxes were created for each respective assignment. Students needed to take pictures with either a phone or a computer’s camera to use for submission. Once submitted to Schoology, students received feedback and then the markings were transferred to PowerSchool, the district’s gradebook system. For Algebra, students received either a “complete” or “incomplete” marking, and in Algebra 2, students received a numerical score ranging from 0-5. Any score was labeled a “0” was also given the “missing flag” within the gradebook to signal no assignment was turned in.

At the end of each chapter, a cumulative test was given to the students. Once the tests had been scored, the data collection began. To collect the data for this research, each student was looked at individually. To find the homework completion rate, the total number of completed assignments was

divided by the total number of given assignments to represent the completion rate as a percentage. After doing this for all students, the homework completion percentages were compared as well as the summative score as a percentage and conclusions were made.

Data Analysis Plan

The data analysis compared how students who completed homework performed on assessments versus those who had a lower homework completion rate and assessment scores using a correlation. This was used in this research plan because a correlation test can help determine if there is a significant relationship between the two variables being tested. For this action research project, the homework completion was compared to the summative assessments to see if there was any correlation between the two. The homework completion variable was different for each class since homework was not graded in Algebra, but it was graded in Algebra 2. The analysis will focus on the correlation results to produce any findings.

IRB Approval

Before this research was conducted, an IRB exemption was filed and approved for this research. The main reasons an IRB exemption was filed were as follows:

1. The research was conducted in an established and commonly accepted education setting and involved normal educational practices.
2. The research will not have an adverse impact on student learning.
3. The research will not adversely impact teacher assessment.

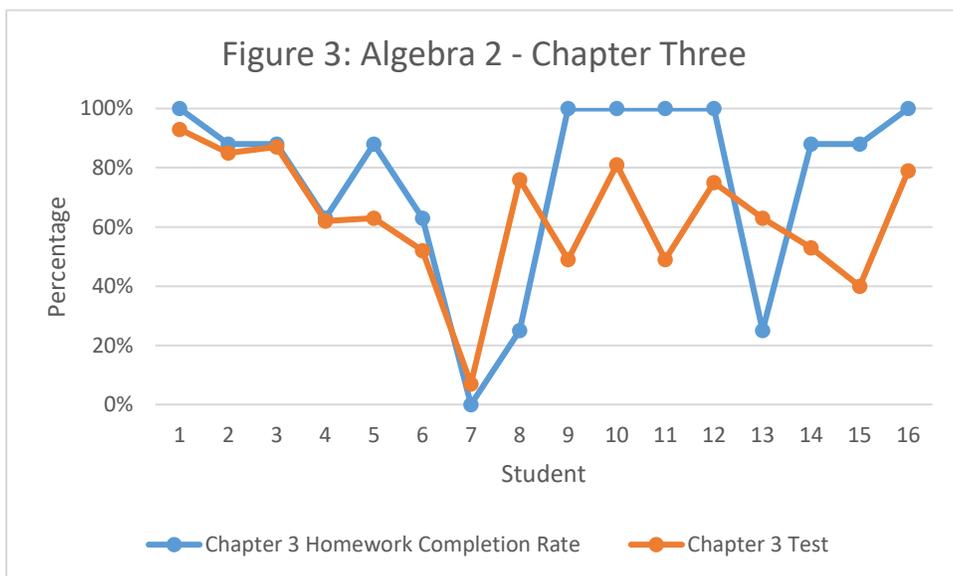
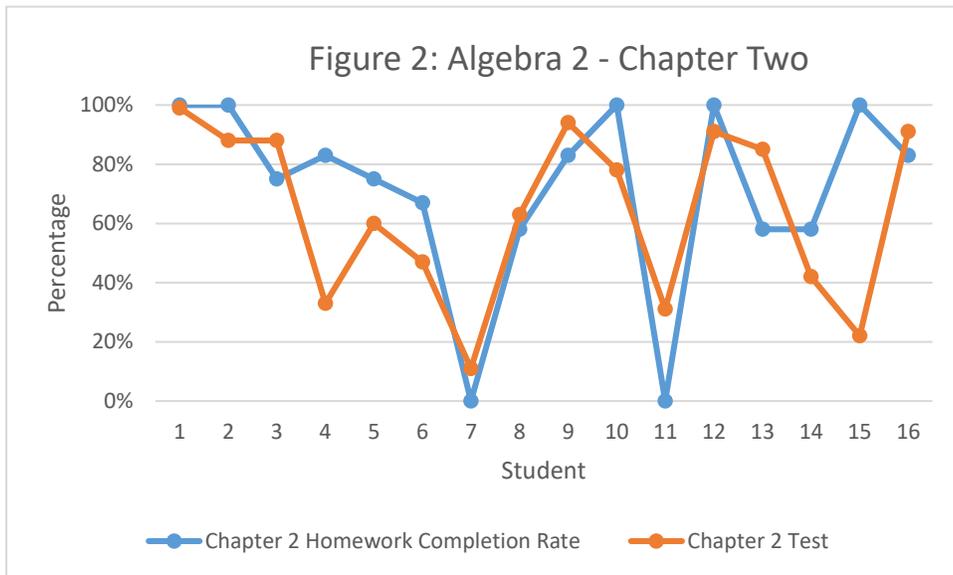
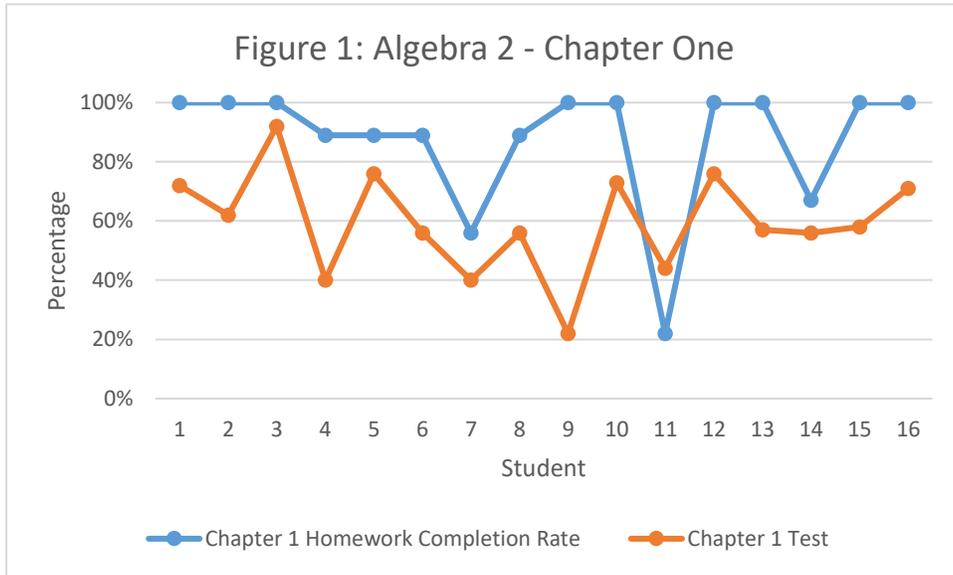
This action research was conducted inside an educational setting and had no adverse effects on how the participants learned or demonstrated learning. All information regarding the participants was kept confidential and anonymous throughout this research project. Names, personal information, or any defining characteristics were not shared in this paper to keep all information about the participants confidential.

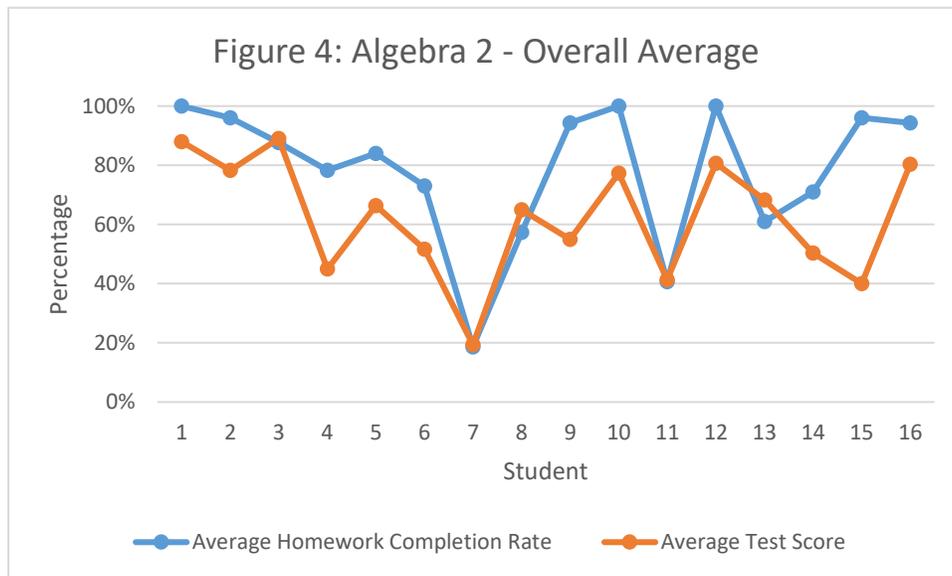
Findings

Data Analysis

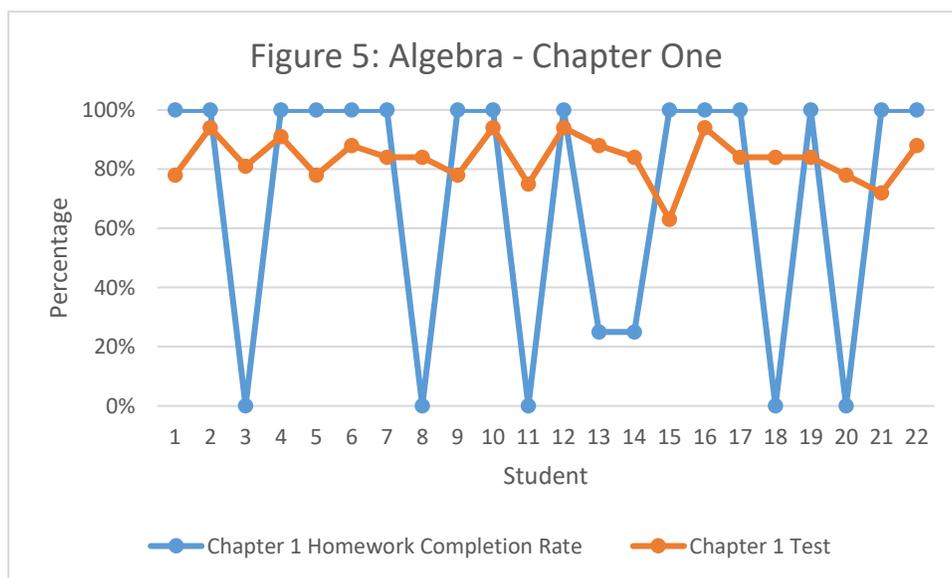
In response to the research question, “do students who complete their homework regularly perform better on summative assessments,” a correlation analysis was done to determine if there was a relationship between the variables. Data was collected over a nine-week grading period and was organized in an Excel spreadsheet. For both Algebra and Algebra 2 classes, three chapters were covered over this period. For each chapter, the number of assignments and which assignments were or were not completed were tracked. Students received either a “1” for a completed assignment or a “0” for a missing assignment in the Excel spreadsheet. After each chapter was completed, the average homework completion rate was found for each student. In addition to this, the percentage score students received on the chapter test was also recorded in the spreadsheet. Two final columns added to calculate each student's overall homework completion percentage and test score average. Each individual chapter as well as the overall averages were used when calculating the correlation analysis.

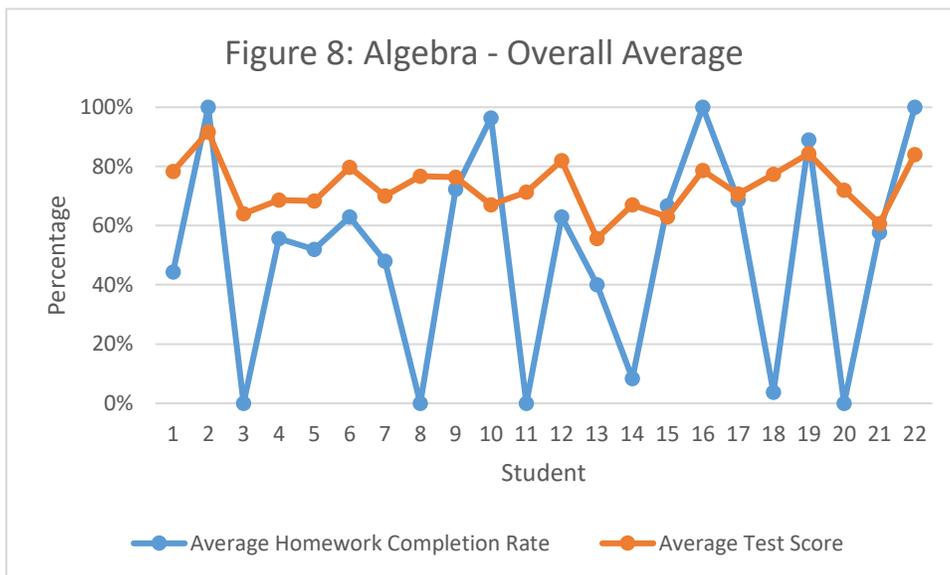
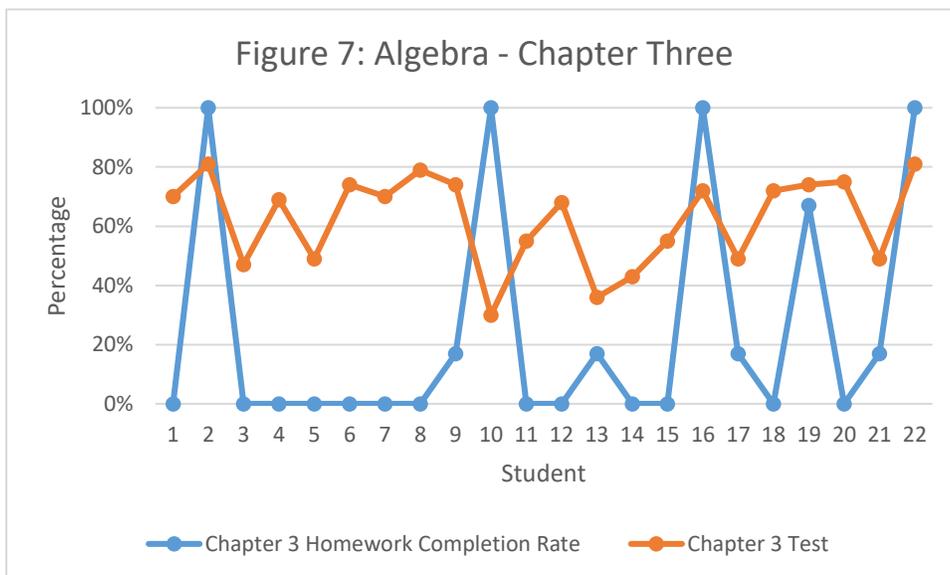
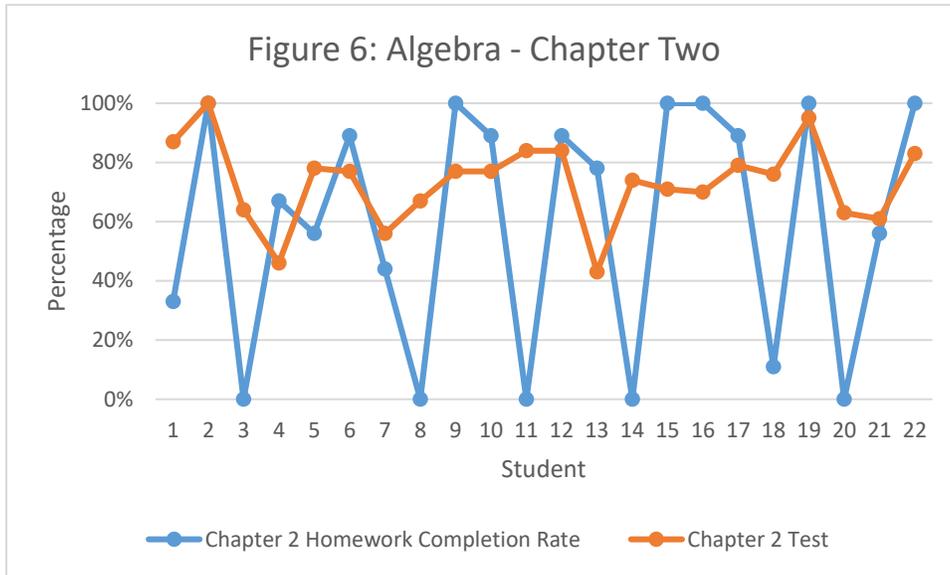
In the Algebra 2 class, the overall average homework completion rate and overall average test score was found to have a moderate to strong positive correlation, $r(14) = 0.69$, $p < 0.05$. For the individual chapters, Chapter 1 showed $r(14) = 0.38$, $p > 0.05$, Chapter 2 had data which showed $r(14) = 0.59$, $p < 0.05$, and Chapter 3 ended with $r(14) = 0.48$, $p > 0.05$. The individual chapter results all showed a positive correlation ranging from 0.38 to 0.59. However only one had a significant p-value, which was Chapter 2.





For the Algebra class, while there was still a positive correlation found between the homework rate and summative assessment scores, there was not a significant p-value recorded for any of the chapters or the overall average. The data showed the following: Chapter 1, $r(20) = 0.16$, $p > 0.05$; Chapter 2, $r(20) = 0.24$, $p > 0.05$; Chapter 3, $r(20) = 0.12$, $p > 0.05$. When looking at the overall homework completion and test score averages, the data showed $r(20) = 0.38$, $p > 0.05$, which does show the most positive correlation, yet not a significant p-value.





Discussion

Summary of Major Findings

The purpose of this action research project was to study if homework completion had any effect on how students performed on a summative assessment. While a positive correlation was found between the two variables, the results on whether it was significant were inconclusive. For both Algebra and Algebra 2, most of the chapters analyzed showed there was not a significant p-value, which means there could have been other factors determining the positive correlation. While the research done in the Algebra class showed insignificant results, Algebra 2 was able to yield some significant results. Specifically, Chapter 2 showed a stronger correlation between homework completion and how students performed on the assessment. In addition to this, the overall homework completion rate and assessment rate averages showed a positive correlation as well as a significant p-value.

In respect to the Algebra class, as more data is collected on these two variables, the correlation appears to increase and become more positive, therefore, moving the p-value towards a more significant value. Also noteworthy is the average homework completion rate and test score average were computed for each individual chapter. For Chapter 1, the average homework completion rate was 70% with an average test score of 84%. However, these two rates significantly dropped by Chapter 3 to a 24% and 62%, respectively. This data supports the conclusion not grading homework in Algebra negatively effects student motivation to complete the assignments; and therefore, the test scores reflected a lack of practice as well.

Overall, the relationship between homework completion and summative assessments scores are positively related, although not always significantly. While this research supports the idea homework completion will help improve students' assessment scores, the results are not consistent enough to allow for any major conclusions to be made. There are several factors could have influenced the outcomes; this reality should be taken into consideration when reviewing the data.

Limitations of the Study

One of the potential limitations is the idea there may not be a direct link between homework completion and test scores. While others have studied this issue, there have been no conclusive results found and the results are contradictory of each other. Whether homework completion can affect summative assessments can change from year to year depending on the classroom and the environment. It is possible for the students involved in this study the COVID-19 pandemic affected their performance: these students are missing some needed background knowledge to perform well at the high school setting. Many students have a major gap in their learning from two years ago, and this deficit needs to be considered as we look at this study's results.

Another limitation to consider is the intrinsic motivation students may or may not have. Some students will naturally perform better on summative assessments because of more innate math ability. These differences in natural ability can skew the data if several higher-ability students are placed in one section of a class. In addition, other students may not have the motivation to complete homework assignments, or the internal ambition to perform the best on summative assessments. These factors are dependent upon the type of students placed within these classes and can affect the research process. Moreover, students in Algebra 2 may be naturally more inclined to complete homework because a grade is given, and therefore the overall class score will be affected. Since the Algebra students are not receiving numerical credit for homework and instead are given formative assessments which will be graded, it could be a natural reaction these students will not complete homework because it does not provide an immediate reward.

Branching off this limitation is the fact each class is unique in terms of student needs. In every class, there will be students who are high achieving as well as students who need a lot of assistance in all academics. The general make-up of each class varies drastically and can impact the research being done. Along these lines, it is important to consider this research was done using a small sample size. One section of Algebra and one section of Algebra 2 was used for this research, and the results could easily

change if different sections were chosen. The research for this project was also limited due to time constraints, and the results could be significantly different if this research had been done over an entire school year instead of being constrained by the nine-week period was used.

A final limitation to consider is students in Algebra 2 will have had prior experience with the researcher as a teacher from previous years. By contrast, the Algebra students are new to the high school and face a major adjustment period transitioning from the middle school. The Algebra 2 students will be familiar with the researcher's teaching style as well as the expectations of the class and the building. These students will be primarily juniors and seniors and have experience with the school policies and procedures. Algebra students are all coming from the middle school and have no understanding of how the high school will be different and what expectations will be. The fact this research took place at the start of a school year could have affected the results.

Further Study

Based on the results of this action research project, it would be beneficial to continue to study the effect homework completion has on summative assessments and see if more conclusive results could be reached. Going forward, a longer research period could produce more consistent results allowing for more definitive evidence potentially supporting the connection between homework completion and assessment scores.

For this study to be recreated, it would be best to start with a new group of participants and to extend the amount of time given to this research. Looking at a semester or even a full school year would allow the research to be conducted in a manner to produce more significant results. It should also be studied how grading homework influences the completion as this correlation seems to be a factor from this experiment. Finding ways to foster motivation and the connection to homework would open up an additional area of research not covered in this project.

Conclusion

Homework can be used in a variety of different ways within classrooms, and it is important to look at how homework completion impacts student performance on assessments. Whereas the results of this action research project were inconclusive, this relationship would benefit from future research. In this study, homework completion and student performance on summative assessments were positively correlated; therefore, this relationship should continue to be a focus for educators within individual classrooms. Moving forward, teachers within schools should be continuously improving homework practices and continue to emphasize the importance of practice to students.

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