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The Effect of Feedback Given on Informal Assessments and its Continued Effect on Formal Assessments

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Abstract

This quantitative study investigates the use of immediate and delayed answer corrective feedback provided on informal assessments, with the use of technological tools, and its impact on formal assessments on senior level, high school students from a rural Minnesota high school. Specifically, this study investigated the impact of both immediate and delayed answer corrective feedback to determine if both/either are effective in helping improve students formally. Students participated in an eight-week study in which two smaller sections were provided immediate answer corrective feedback informally, with the use of Kahoot. An additional (one) section was provided delayed answer corrective feedback with the use of Quizizz. All individuals scores were compared from formal to informal each week. Additionally, averages of each section were compared to determine overall effectiveness and consistency of scores. Upon completion of data analysis, both types of feedback were found to positively impact performance from informal to formal assessment scores. This was evident in that sections which received immediate answer corrective feedback saw score increases of 7% and 8%. The group which received delayed answer corrective feedback saw score increases of 19%. Additionally, delayed answer corrective feedback was found to be more effective. This was evident in that achievement was increased by 19% compared to 7% and 8% by the groups who received immediate answer corrective feedback. Implications of this study include that different technological tools were used to informally assess students which may have impacted the results of this study.

Chapter One

Introduction

General Problem/Issue

Feedback, in education, refers to information provided for students that reflects on their individual performance (Cutumisu & Schwartz, 2017). Feedback may be provided at different times and used in different ways but to roughly define feedback in education it is the practice of providing guiding or corrective comments on students work so they may improve their work in the future. With this in mind, for students, feedback can be viewed as an essential piece of their learning process (Boud & Molloy, 2013). Furthermore, feedback extends into their learning process beyond the initial task providing greater benefits in learning and future success (Cutumisu & Schwartz). Feedback is crucial in education so students may grow in their learning and overall content understanding.

Feedback is a critical component in learning and academic success as it provides necessary support for students. When feedback is provided the potential learning benefits are many. When a student receives feedback it should appear informational and motivational to appeal to their basic learning needs (Cutumisu & Schwartz). Additionally, feedback can help students recognize where they may be falling behind early on, when used and applied effectively (Kim & Shakory, 2017). Feedback can also help students make future corrections because of its applicable impact on memory (Cutumisu & Schwartz).

Although the benefits of academic feedback are widely accepted the best mediums for giving feedback are not yet common knowledge (Cutumisu & Schwartz).

To understand why this is not yet known one must recognize that there are many different types of feedback. Feedback can be as simple as referencing whether or not a student's response is correct. Feedback can explain how a student may improve or identify what needs to be fixed in future practice. Additionally, it can also be given immediately or may be intentionally delayed for a given timeframe. Feedback can be provided orally, written or even provided digitally, even sometimes from a device itself (i.e. not the teacher).

Recognizing that feedback can be provided in a multitude of ways, discovering the best method of delivery would be valuable for educators and students alike. Of course, one should also consider that what might be the 'best' method for providing feedback for elementary students may differ for middle, and high school students. This means that each type of feedback and each level (of students) should be investigated separately.

While working with high school students I have discovered how valuable feedback can be for student learning and how beneficial it can be for their confidence and understanding. In my professional position, I have witnessed students checking their provided feedback as they continue to review, revise and learn. For example, to improve my practice and to help better facilitate student learning I have decided to further investigate different methods of feedback to discover which method is most appropriate for high school students and beneficial for their continued learning.

After researching different types and timings of feedback that may be provided, through my review of literature I have observed that providing answer corrective feedback can provide learning opportunities that may increase student achievement. Recognizing the potential benefits, I decided to research this method to learn about

providing feedback and student achievement. Meaning, I have worked to provide answer corrective feedback for students meaning that students have been provided them with the correct answer, after they have provided their initial answer response, as a form of feedback. Furthermore, I choose to investigate the most appropriate time(s) (beyond verification) for answer corrective feedback. This means that I have investigated whether immediate answer corrective feedback or delayed answer corrective feedback is more effective. My hope is that sharing these findings may support students in learning and that students may be able to utilize the provided feedback to improve their confidence, their interest in learning, and their formal assessment scores.

Subjects and Settings

Description of subjects. Participants were selected from a population of 11th and 12th grade history students. These students were between the ages of 16 and 19. Students at the particular institution used, attended the high school building from grades 6 – 12 at this particular site. 59 students enrolled in the course used for this study from the 2018-2019 school year. Four of these students utilized Individualized Education Plan(s) (IEP). Ten of the fifty-nine students received free and reduced lunch.

Selection criteria. All students selected for this study were required to take the World History course (class utilized in this study) to graduate from this specific high school (site). The students had to register to take one of three sections (mentioned above) that were offered for this course. As mentioned above they made-up a convenience sample of 59 students, and all had provided authorization as given to them by their parents to participate in this study. Within these World History courses students were divided into one of the three sections. Two of the sections were smaller in class size

compared to the other. One section had 17 students, another had 18 and the last section has 24 students. The two smaller sections received immediate answer corrective feedback and the larger section received delayed answer corrective feedback and data from all three sections was collected.

Description of setting. This study was conducted at a rural Midwestern school that exists in a town with a population that just reaches over 2,500 people. As a whole, when comparing student demographics of the time, 1.6% were Hispanic/Latino, 0.4% were American Indian/Alaskan Native, 0.1% were Asian, 95.1% were white, 2.4% were Two or More Races. At the site (during the time of study), there were no English language learning students. 12% of the students qualified for special education services, 17% received free and reduced lunch and 0.2% were homeless (Minnesota Report Card, 2017).

Informed consent. Permission was obtained from the Institutional Review Board at Minnesota State University. Additionally, permission was obtained from the site Principal and Superintendent. The school district's IRB procedure has been followed and used to obtain appropriate permission to conduct research. This involved obtaining permission from the students and their parents where the research was conducted.

All students who participated in this study have been protected and will remain anonymous. Participants were informed of the intent and reasoning of the research study. In its entirety the study was explained both verbally and in writing. Additionally, participants were informed of the risks and benefits of the study and made aware that their identity would remain anonymous. Even though some participants were 18 years of age or older, all students were required to provide written permission from a

parent/guardian to participate in this study. This permission form outlined that they were participating willingly and had the opportunity to withdraw at any time and if anyone had chosen to withdraw they would have been read the Method of Assent.

Chapter 2

Literature Review

Review of Literature

Educators are posed with unique challenges each day in the classroom. Most of these challenges stem from a common goal; how can they better help students learn? In addition, educators work to instill an ability in student to retain information over time (Hays, Kornell, & Bjork, 2010). One aspect of helping to support student learning and retention is by providing feedback. Feedback means to communicate to students information about their understanding and progress in a course. This form of communication works to benefit student performance because it provides students insight as to how they may improve (Dannels, Gaffney & Martin, 2008). Feedback may be used widely in education. For example, providing feedback on participation in class, items discussed, daily work (homework), informal assessments and formal assessments are all items in which students may benefit from provided feedback. Providing feedback to promote learning means that feedback is direct and serving to intervene on student errors (Shepard, 2000). Feedback can be provided orally, written, or though cues that signal accuracy on performance (i.e. these cues could be with hand gestures like a thumbs up or down, or through technology with sounds or signs). Whatever the method of feedback delivery may be it is successful in helping students because there is a social function that provides students information as how they may improve in their future efforts/work (Dannels, Gaffney & Martin, 2008).

One area where feedback may be provided to improve student learning is in formal assessments, particularly in the form of testing. In particular, multiple-choice

testing feedback is beneficial for students who are expected to prepare to state examinations which are primarily composed in multiple-choice question format. Multiple-choice questions are used frequently in state testing because of their efficiency in addressing content over wide population, their ease of application and they are deemed time-efficient in application (McCoubrie, 2004). Given the use of high-stakes state testing it is the role of primary and secondary educators to prepare students for these exams. Preparing students for these test helps with increased student confidence and readiness (for future assessments). Recognizing the need for preparing students for these exams, careful consideration of practicing multiple-choice exams is necessary to determine how they are working to facilitate student learning. This point is reiterated by Butler & Roediger (2008) when they write, "Multiple-choice tests are used frequently in higher education without much consideration of the impact this form of assessment has on learning" (p. 604). Therefore, consideration of multiple-choice testing and its effects on learning should be further investigated.

Part of facilitating student learning and retaining information is to provide feedback on student work and responses so that students have a base point to further construct future learning (Pashler, Rohrer, Cepeda, & Carpenter, 2007). As mentioned above this includes providing feedback on informal and formal assessments, and more specifically tests. Applying practice testing and feedback is beneficial for student retention. This is reiterated by Butler & Roediger (2008) when they state the following, "Taking a test generally improves retention of the material tested—a result commonly referred as the testing effect" (p. 604). Noting this, providing student opportunities to

practice testing (essentially offering opportunities for them to experience the 'testing effect') in combination with feedback, their retention and achievement may improve.

According to Pashler, Rohrer, Cepeda, & Carpenter, (2007) intentional feedback promotes overlearning and increases a learners ability to recall information, when feedback is used as a common learning practice. Timely feedback does affect the learner's probability of memory and retention. Feedback is critical and discovering the most ideal moment and manner can be divisive because some believe it is best to wait before providing feedback while others see greater value in providing feedback as the student moves through their learning process (i.e. while they are writing their paper, or while they are taking their test) (Brosvic, Epstein, Cook, & Dihoff, 2005).

Shute (2008) notes that although initially the intent of providing feedback may aid in learning, feedback can concurrently be a determinant in student motivation in that it empowers them to perform better (as cited in Lepper, & Chabay, 1985). This, coupled with findings that show that students who practice testing (informally) will perform better on testing (formally) (as mentioned above and cited in Butler and Roedinger (2008)), provide students an ideal manner of learning material and opportunities to demonstrate their understanding. To support students in learning and understanding with the use of feedback on assessments the ideal timing must be further investigated. Since it has determined and accepted by many studies that feedback can increase motivation and understanding (i.e. Butler and Roedinger (2008), Butler, Karpicke & Roediger (2008) and Carpenter & DeLosh, (2006)), how to appropriately initiate (time-wise) and supply feedback is less definitive. According to Brosvic, Epstein, Cook & Dihoff (2005) there is support for both the ideas of implementing delayed feedback, and of immediate feedback.

However, when considering between immediate or delayed feedback, it was recognizable that timing is not the only factor necessary to investigate. Additionally, it was crucial to provide feedback on answers such as verification (feedback stating if something is answered correctly or incorrectly) or corrective (feedback stating if something is answered correctly or incorrectly and additionally providing the correct answer) to consider what is best for future implementation (Marsh, Lozito, Umanath, Bjork & Bjork, 2012). Investigating the timing and type of feedback used can provide educators with answers to better help them with their instructional practice. The combination of timing of feedback and type provided is what this study has investigated to determine what may help students increase achievement.

Definition of terms.

For the purpose of this study, the following terms are defined:

Informal assessments: are learning activities designed to assess student knowledge on specific content without affecting a grade or course outcome. Informal assessments serve as opportunities for students to become self-aware of their performance and additionally help improve their performance in the future because students will have an opportunity (on formal assessments) to draw upon their prior knowledge of their formal assessment performance (Shepard, 2000).

Formal assessments: are assessments (learning activities) that are designed with the intent of measuring a student's specific understanding of curriculum. In such activities, the student is required to work to provide evidence of their understanding on a given format (i.e. test, project, presentation) which is provided by their instructor (Yorke, 2003).

Immediate feedback: to provide immediate feedback means to provide a student with answer feedback (meaning to provide the correct answer response) before they move on to the next question (Brosvic, Epstein, Cook, & Dihoff, 2005).

Delayed feedback: to provide delayed feedback means to provide a student with answer feedback at some point after they have can concluded their assessment or assignment. This 'time' could be immediately upon completion or within twenty-four hours (Brosvic, Epstein, Cook, & Dihoff, 2005).

Verification feedback: to provide verification feedback means to provide students with a response to their provided answer that indicates whether or not their provided response was correct or incorrect (Marsh, Lozito, Umanath, Bjork, & Bjork, 2012).

Answer Corrective feedback: to provide answer corrective feedback means to provide students with a response to their provided answer that indicates whether or not their provided response was correct or incorrect and (additionally) identify the correct response to the question (if the initial response was incorrect) (Marsh, Lozito, Umanath, Bjork, & Bjork, 2012).

Computer Assisted Instruction: refers to the use of technology to guide and instruct learning and monitor students' progress and results (Brosvic, Epstein, Cook, & Dihoff, 2005). In this study computer assisted instruction will be utilized in proving both informal and formal assessments.

Statement of Purpose

The purpose of this study was to determine what the most effective type of academic instructional feedback; immediate or delayed when combined with answer feedback while using computer assisted instruction. This study was done while using

computer assisted instruction because the district in which this study was conducted in is a one-to-one device school, meaning all students are provided school issued technology to use. Part of the school's mission is to integrate this technology into as much of the school day as possible and utilizing computer assisted technologies will work toward meeting the mission of the school. Participants were selected from a population of 12th grade history students who utilized computer assisted informal assessments prior to engaging in formal assessments. Some students used computer assisted instruction that provided them with immediate answer feedback (i.e. immediately after they responded to a question the program utilized let them know if they answered correctly or incorrectly and if they answered incorrectly they were provided the correct response), while others used computer assisted instruction that provided immediate verification, but delayed answer feedback (i.e. after they completed each question they were notified if they answered correctly or incorrectly but they were not be able to review all questions and correct responses until they had completed the informal exam) . (Please note, both computer assisted technology programs utilized for this study will be outlined later in this text.)

The informal assessment scores of each group were compared to their formal assessment scores to determine the effect of feedback for both groups. Meaning each group was studied to determine how students' scores compared individually (comparing student scores from informal assessments, to formal assessment to investigate the academic performance of each student) and as groups (to determine if the overall average rate of (expected) improvement for each group is different). These data will help to explore the effects of both types of feedback and assessment. The pre-test served as an

informal assessment delivered in an organizational manner that may have influenced what the learner should have expected on their formal assessment. Repeating this practice over time allows students to practice working with feedback in their learning processes and organizational preparation (Robert, Bangert-Drowns, Chen-Lin, Kulik & Morgan, 1991).

Theme I.

Feedback and Learning

In the history of educational studies, feedback has been continually identified as an essential component of instructional practice and learning (Jean & Mandernach, 2005). "The premise underlying most of the research conducted in this area is that good feedback can significantly improve learning processes and outcomes, if delivered correctly" (Shute, 2008, p. 154). Put simply, feedback is a factor that supports learning in any instructional and learning capacity (Narciss & Huth, 2004). Even though psychologists and educators believe this, some still believe there is limited evidence as to how and when feedback should be best delivered (Goodman, Wood & Hendrickx, 2004). Though it should be noted that it is also recognized that the spacing of learning and relearning with the intentional practice of feedback does affect retention (Pashler, Rohrer, Cepeda, & Carpenter, 2007).

Testing and Feedback

Pretesting before (formal) testing affects future retention positively because it may provide students opportunities to experience the 'testing effect' (described previously) from (Butler & Roediger, 2008). Providing pretesting experiences for students gives students opportunities to make mistakes, and work through these mistakes

to benefit their understanding (Roediger & Karpicke, 2006). This is because students are able to address errors and focus their attention on the content areas they have identified as areas of improvement. Additionally, both verification and answer feedback help students produce correct answers in future testing (Marsh, 2012, p. 650). This is because they have an opportunity to relearn content and focus their attention on areas that may need improvement. According to Roediger & Karpicke providing answer feedback to students may provide increased levels of accuracy in future performance in ways that current research does not recognize. Answer feedback is more valuable than verification feedback because it alters their incorrectness and reinforces correctness (Jean & Mandernach, 2005).

Theme II.

Error Correction and Confidence

Initially, when a student answers informally (awaiting feedback) and they report feeling low confidence in their response, answer feedback can increase their answer confidence in the future. Providing feedback can do more than correct responses for a later test, it can help students develop their metacognitive skills (i.e. in this case, by helping them think and plan on how to study and learn content for future assessments) and grow in their confidence and approach toward future examinations (Butler, Karpicke, & Roediger, 2008). To explain this change, Butler, Karpicke, & Roediger (2008) describe that this occurs because the student will reinforce their confidence of association response and diminish or eliminate competing answer responses.

Practicing answer retrieval (informally) provides advantages on later (formal) assessments (Carpenter & DeLosh, 2006). “The act of retrieving information from

memory serves to modify the memory trace and increase the probability of future retrieval success" (Butler & Roediger, 2008, p. 605). To explain this, Butterfield & Metcalfe (2001) mention that this format simply increases their familiarity with the content in a questionable manner and makes them sensitive to their errors and error correction. Their initial low confidence response changes to a future high confidence response with the use of answer feedback (Butler, Karpicke & Roediger, 2008).

Confidence Increases Motivation

Feedback helps students feel more confident which translates to motivation as well. Motivation theorists conclude that mastery of content is the product of successful task completion and the perception that they are confident in tasks they complete (Narciss & Huth, 2006). This is likely due to students having a greater awareness in gauging their accuracy in response by practicing (informal) testing and feedback (Butler & Roediger, 2008). Feedback fosters their personal perception of content understanding that transcends to future task completion (Narciss & Huth, 2006). This may occur because (study) routines develop from regular feedback, "if students know they will be tested regularly (say, once a week, or even every class period), they will study more and will space their studying throughout the semester rather than concentrating it just before exams" (Roediger & Karpicke, 2006, p. 249).

Additionally, educators today are working to shape future citizens who possess 21st century skills, which include technological competence. Today's students are used to, and expect to use, technology in learning. With this understanding, it should also be noted that computer assisted technologies peak student interest and additionally motivates them (Lepper & Chabay, 1985).

Feedback and Performance

To guide students in the learning and recall process, monitoring their informal processing will bring forth changes in their learning behavior by helping them regulate their responses (Robert, Bangert-Drowns, Chen-Lin, Kulik, & Morgan, 1991). Taking time to provide feedback for students does improve future student performance (Marsh, Lozito, Umanath, Bjork, & Bjork, 2012). Providing verified feedback for students will not improve their performance on a formal assessment as answer feedback may (Pashler, Cepeda, Wixted, & Rohrer, 2005). Answer feedback (as opposed to strict verification, with no corrections) supports student learning because it provides them opportunities to determine a correct response (Marsh, Lozito, Umanath, Bjork, & Bjork, 2012).

Hypothesis Statement

Informal assessments with immediate answer corrective feedback for students are more effective for student learning and contribute to higher formal assessment scores than delayed answer corrective feedback.

Chapter 3

Methodology

Research Questions.

While working with high school students I have witnessed their appreciation for feedback on formal and informal assignments. I became curious as to what type of feedback is most effective, immediate answer corrective feedback, or delayed answer corrective feedback. Determining what type is most effective would mean that I could provide students with the best opportunity to access and utilize feedback that could help them grow and learn. Applying the most effective type of feedback would not only facilitate student learning but also help me enact my best practice as an educator. In hopes of meeting these goals I formulated the following questions I wanted to answer through my action research study:

1. What is the effect of immediate answer corrective feedback on informal assessments and future assessments?
2. What is the effect of delayed answer corrective feedback on informal assessments and future assessments?
3. What type of feedback is more effective, delayed answer corrective feedback, or immediate answer corrective feedback?

Answering the above questions will help me improve my teaching instruction and implementation of feedback to facilitate student learning. I will also be able to determine if this type of feedback can help students improve their formal assessment scores.

Research Plan

Methods and rational. Due to the volume of data necessary to increase the validity of the results, and due to the fact that there is currently not a standardized test in the content area used for this study, standardized testing was not the most appropriate measure to compare for feedback impact. Each student took informal 'pre quizzes' the class day before a formal quiz or test. All of which were written by the instructor and delivered using Quizizz or Kahoot, (technology assisted informal assessments) and online testing (formal testing application on each students iPad and both formats were aligned with the state standards. Quizizz and Kahoot (informal assessments) were created by having the instructor (creator) write multiple-choice questions which (upon completion and implementation) appeared question by question on a student's iPad Two groups were constructed. Both groups received the same questions but one group received immediate answer corrective feedback, and the other group received delayed answer corrective feedback. Tests (formal assessments) were constructed using the Schoology program (school-issued, required, program) and questions were formulated as the instructor (creator) desires (i.e. multiple-choice, matching, true or false, short response, essay). When students took their formal assessments they did not receive feedback during, or at the conclusion of their test, and all feedback was delayed until all students had completed the test and scores were posted. (Note, feedback provided on the formal assessments is not a component investigated for this study).

Two programs were used to collect data on informal assessment scores, which included two methods of delivery. One of which provided immediate answer corrective feedback to the student, while the other provided delayed answer corrective feedback to

the student. (Meaning that the group which received delayed corrective feedback did not receive corrective responses until the entire informal assessment was completed.) Both of which calculated the students overall score. This ensured that the data was content/standard aligned, observable and individualized.

Kahoot (https://kahoot.com/welcomeback/) was one program used to develop online informal assessment formats, which for this study, the instructor used to create informal assessments which worked to measure immediate answer corrective feedback. Essentially, Kahoot is a digital format in which the instructor creates a quiz and the quiz is displayed in a competitive game-like format. In such format, the quiz is presented question by question on a SmartBoard, in addition to a theme and 'game' code which are also displayed on the SmartBoard. Students work to provide answers using their devices (school-issued iPads) only viewing and answering one question at a time. The group using this format received immediate answer corrective feedback as they were able to see verification as to if they responded correctly, or incorrectly, and immediately had the ability to receive answer corrective feedback. Kahoot online formats are directed to be used for primary and secondary students.

The group that received immediate answer corrective feedback was provided reinforcement after every question telling them if they answered correctly or not, and additionally it provided them with the correct response if they responded incorrectly.

Quizizz (https://quizizz.com/) is an additional program used to develop online informal assessment formats, which for this study, the instructor used to create informal assessments which worked to measure delayed answer corrective feedback. Essentially, Quizizz is a digital format in which the instructor creates a quiz and the quiz is displayed

in a competitive game-like format. In such format, the quiz is presented question by question on the student's device, while a theme and 'game' code is displayed on a SmartBoard. Students work on the quiz at their own pace (only viewing one question at a time). The group the received delayed answer corrective feedback saw verification as to if they responded correctly, or incorrectly, but did not receive answer corrective feedback until they had answered all questions. Once members of this group had answered all questions they were be able to review all questions and correct responses. Quizizz online formats are directed to be used for primary and secondary students.

These data (their scores on the informal assessment) were compared to their scores on their formal assessments (each individually, and collectively as a whole). The formal assessments were provided as a digital (iPad) test taken by each student on Schoology (https://www.schoology.com/) and covered the same content in reference to the informal quiz format. The instructor created questions for both types of informal assessments and formal assessments, that directly correlated with the current content of the class. Such content was determined by the state standards and the school district. Feedback provided on formal assignments was provided by Schoology and since all students were not be able to see this feedback until all students had completed the formal assignments it was provided as delayed answer corrective feedback. Here, 'delayed' does not have a definitive time (as in the informal assessments) because this time was dependent on all student completing the formal assessments. Additionally, the instructor orally discussed each question with the students and discussed (with the students) why each answer was the correct answer.

Schedule. The process of implementing different informal assessments followed by uniform formal assessments occurred weekly, over the course of eight weeks. The classes met each day for forty-five minutes of a five-day school week. The class days between informal or formal assessments included lectures or activities with new content that was built off of prior (learned) content and which prepared them for the next upcoming informal and/or formal assessment. Data including individual and class score averages on formal assessments was calculated to determine if one type of informal assessment could positively impact informal to formal assessment scores.

Ethical issues. Utilizing informal assessments may have caused stress on the students, especially those who have test anxiety as would have added additional 'test like' situations. Additionally, utilizing the digital formats mentioned above to gather data also may have made some students anxious. These formats may have caused some to feel anxiety because each format is 'game like' in nature and for students who may have easily grown competitive this may have felt like a competition to do well in. Even though these particular students had school issued devices and were used to using technology in every class, some may have felt stressed with using technology to informally quiz.

Chapter 4

Results

Data collection. Data for this study were collected with the use of informal and formal assessments. Informal assessments served as the intervention for this study and were implemented with the use of computer assisted technologies. One group was provided Kahoot format reviews and received immediate answer corrective feedback. Another group was provided Quizizz format reviews and received delayed answer corrective feedback. Each participants score was collected as data. Additionally, on the following class day, students were provided formal assessments (quiz or tests) with the use of Schoology. Formal assessments were implemented the same for all groups. Data from formal assessments were collected and compared to informal scores.

Student achievement. Student achievement was measured for each individual on every formal and informal assessment. Each assessment was administered and then scores were collected to calculate a comparison between their informal and formal assessment score with each weekly administration. Their informal score data was collected but did not impact the participants grade, but the formal score data was collected and additionally was factored into each individuals grade. In determining student achievement each participants weekly informal and formal assessments scored were compared by number value and percentage value. Additionally, after comparing these scores, it was determined if the students increased their performance, decreased their performance, saw no change in performance, or if the student was not able to participate in the informal assessment on a given week, Insufficient Data was noted for that individual. At the conclusion of the eight-week study period, mean scores were

calculated for each individuals informal and formal assessment performances to draw summative comparisons for each participant in this study. Additionally, mean scores were calculated for each section (three total sections) to view class averages (collectively) on informal and formal assessment scores.

Results. *Research Question 1: What is the effect of immediate answer corrective feedback on informal assessments and future assessments?*

When comparing the overall percentage averages (as a group, rather than individual students) from the informal assessments to formal assessments in section one (seventeen students), one of two sections which received immediate answer corrective feedback, the informal class average score was 65%. The formal class average score was 72%, as shown in Figure 1 below. This means that Section 1 saw an increase of 7% collectively from their informal assessment scores to their formal assessment scores on average, over the 8-week study. These data show that on average, for this section, that students' scores marginally improved from their informal assessment to formal assessment with the use of immediate answer corrective feedback as an intervention. When examining the scores for all students from Section 1 we can see that all but one of seventeen students' scores increased from their informal to formal assessments for this section. This means that the effect of immediate answer corrective feedback for Section 1, on average, positively impacted future formal assessment scores.

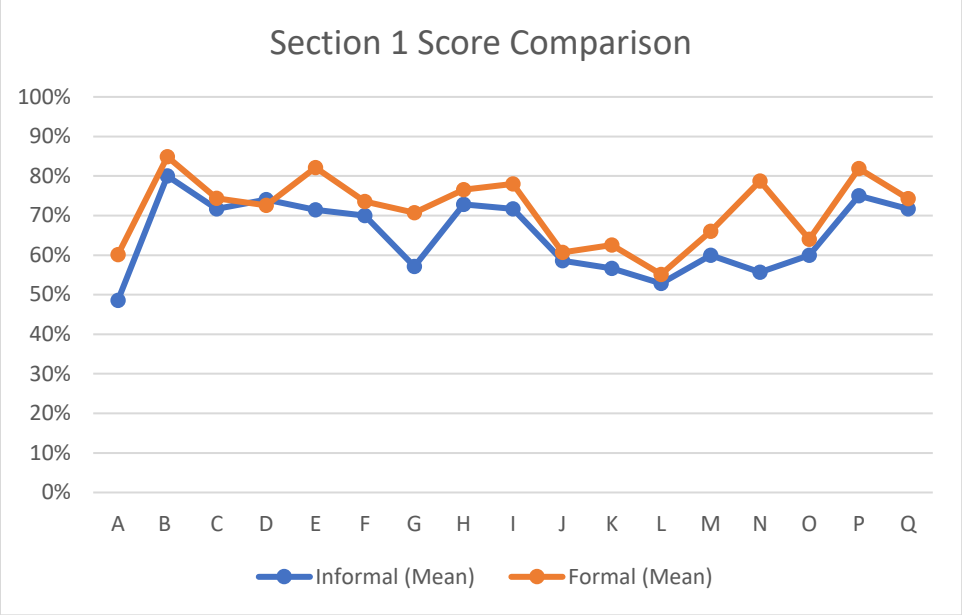

Figure 1.1 Section 1 informal and formal averages

The above information examines the section as a whole. To investigate this data from a different perspective Figure 1.2 (below) addresses three individual students from Figure 1.1 (above). In this case, student B had an informal assessment score average of 80%, and a formal assessment score average of 85% for the eight-week study. Meaning student B saw an increase of 5% on average from informal to formal assessments. Noting this increase, this student represents 'the median' (for this section) when comparing each individuals percentage change. Student D had an informal assessment score average of 74%, and a formal assessment score average of 73% for the eight-week study. Meaning student D saw a decrease of -1% on average from informal to formal assessments. Noting this decrease, this student represents 'the lowest' (for this section) when comparing each individuals percentage change. Student D was the only student in this section who experience a decrease in percentage change from informal to formal assessments. Student N had an informal assessment score average of 56%, and a formal assessment score average of 79% for the eight-week study. Meaning student N saw an increase of 23% on

average from informal to formal assessments. Noting this increase, this student represents ‘the highest’ (for this section) when comparing each individuals percentage change.

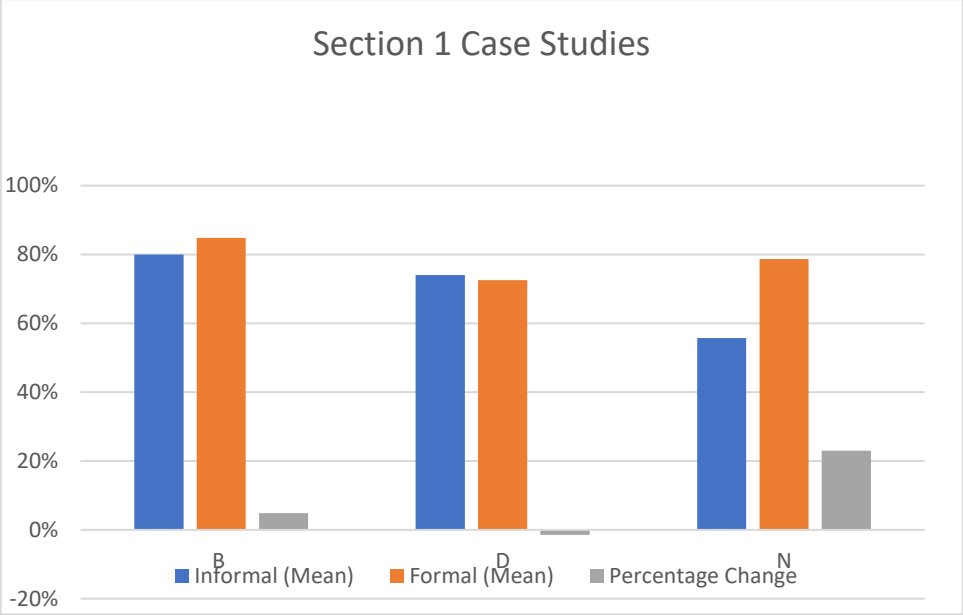

Figure 1.2 Section 1 case studies

The overall percentage averages from the informal assessments to formal assessments in Section 2 (eighteen students), one of two sections which received immediate answer corrective feedback, the informal class average score was 66%. The formal class average score was 74%, as shown in Figure 2 below. This means that Section 2 saw an increase of 8% collectively from their informal assessment scores to their formal assessment scores on average, over the 8-week study. These data show that on average, for this section, that students’ scores improved from their informal assessment to formal assessment with the use of immediate answer corrective feedback as an intervention. When examining the scores for all students from section two we can see that all but three of eighteen students’ scores increased from their informal to formal assessments for this section. This means that the effect of immediate answer corrective feedback for Section 2, on average, positively impacted future formal assessment scores.

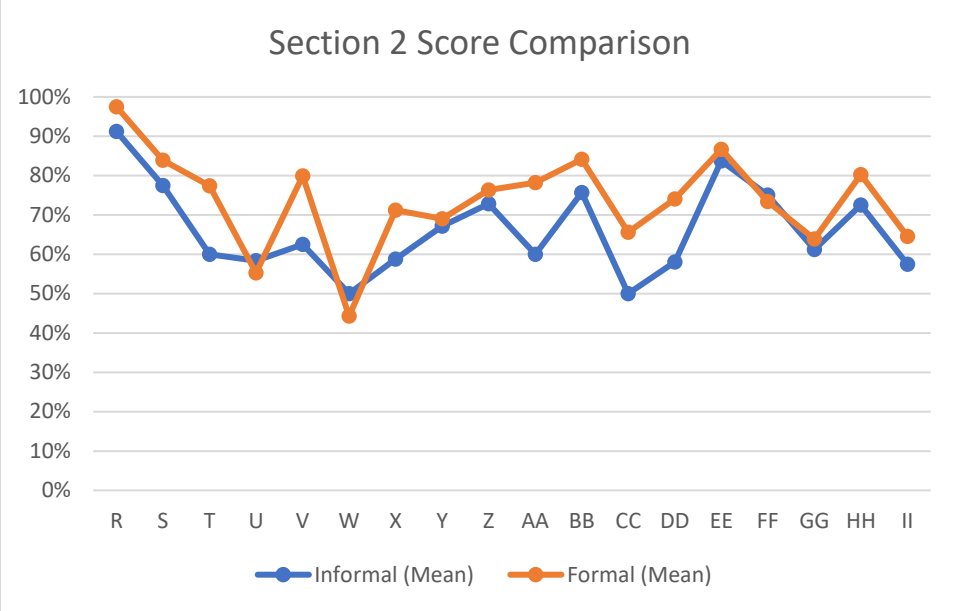

Figure 2.1 Section 2 informal and formal averages

The above information (Figure 2.1) examines the section as a whole. To investigate this data from a different perspective Figure 2.2 (below) addresses three individual students from Figure 2.1 (above). In this case, student S had an informal assessment score average of 78%, and a formal assessment score average of 84% for the eight-week study. Meaning student S saw an increase of 6% on average from informal to formal assessments. Noting this increase, this student represents 'the middle' (for this section) when comparing each individuals percentage change. Student W had an informal assessment score average of 50%, and a formal assessment score average of 44% for the eight-week study. Meaning student W saw a decrease of -6% on average from informal to formal assessments. Noting this decrease, this student represents 'the lowest' (for this section) when comparing each individuals percentage change. Student W was one of three students in this section who experienced a decrease in percentage change from informal to formal assessments. Student AA had an informal assessment score average of 60%, and a formal assessment score average of 84% for the eight-week study. Meaning

student AA saw an increase of 18% on average from informal to formal assessments. Noting this increase, this student represents 'the highest' (for this section) when comparing each individuals percentage change.

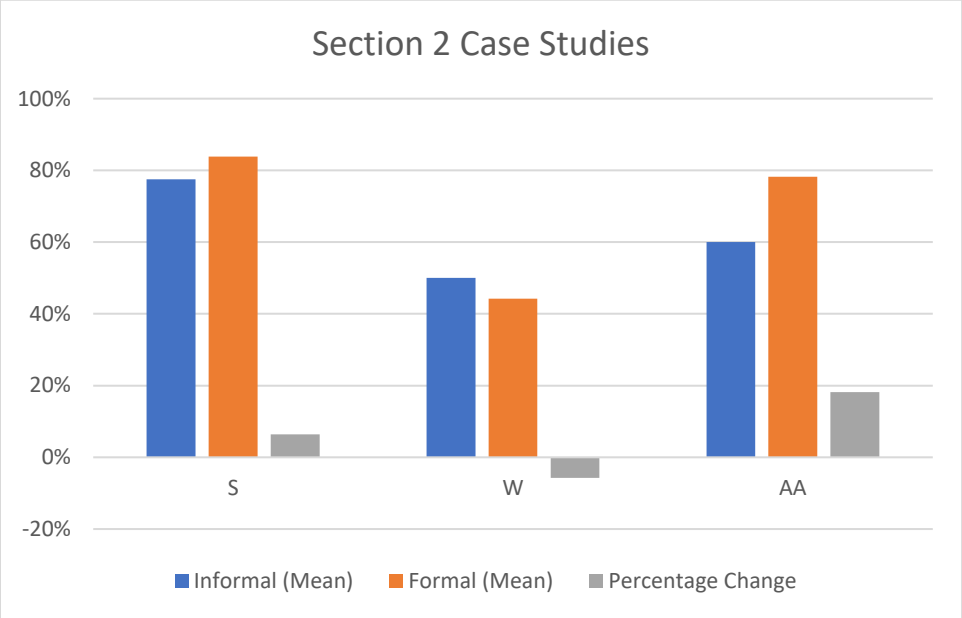

Figure 2.2 Section 2 case studies

Research Question 2: What is the effect of delayed answer corrective feedback on informal assessments and future assessments?

The overall percentage averages from the informal assessments to formal assessments in Section 3 (twenty-four students), the one section which received delayed answer corrective feedback, the informal class average score was 62%. The formal class average score was 81%, as shown in Figure 3, below. This means that Section 3 saw an increase of 19% collectively from their informal assessment scores to their formal assessment scores on average, over the 8-week study. These data show that on average, for this section, that students' scores improved from their informal assessment to formal assessment with the use of delayed answer corrective feedback as an intervention. This

means that the effect of immediate answer corrective feedback for Section 3, on average, positively impacted future formal assessment scores.

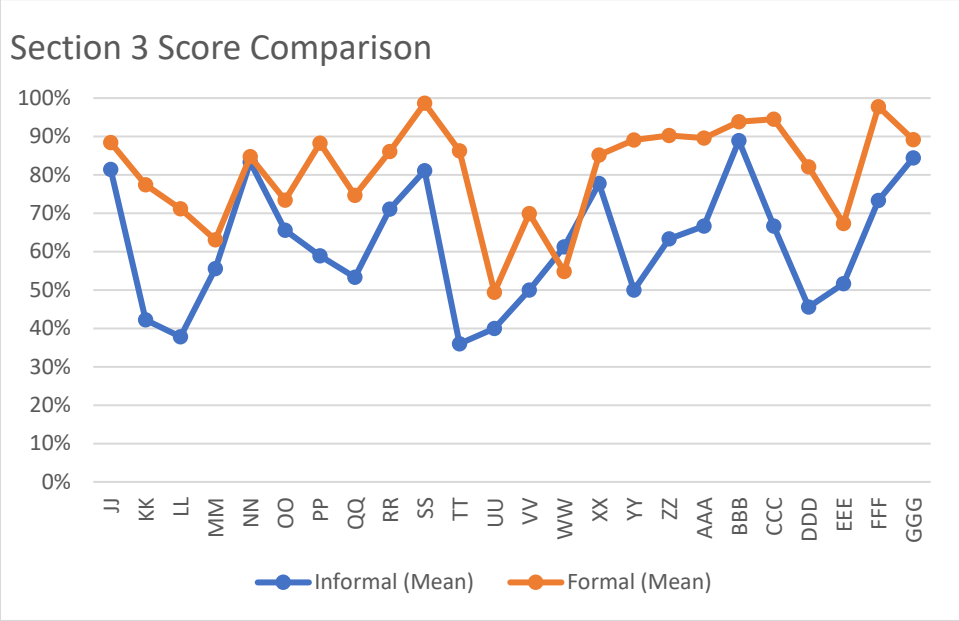

Figure 3.1 Section 3 informal and formal averages

The above information (Figure 3.1) examines the third section as a whole. To investigate these data from a different perspective Figure 3.2 (below) addresses three individual students from Figure 3.1 (above). In this case, student SS had an informal assessment score average of 81%, and a formal assessment score average of 99% for the eight-week study. Meaning student SS saw an increase of 18% on average from informal to formal assessments. Noting this increase, this student represents 'the middle' (for this section) when comparing each individuals percentage change. Student TT had an informal assessment score average of 36% and a formal assessment score average of 86% for the eight-week study. Meaning student saw an increase of 50% on average from informal to formal assessments. Noting this increase, this student TT represents 'the highest' (for this section) when comparing each individuals percentage change. Student

WW had an informal assessment score average of 61%, and a formal assessment score average of 55% for the eight-week study. Meaning student saw a decrease of -6% on average from informal to formal assessments. Noting this decrease, this student represents 'the lowest' (for this section) when comparing each individuals percentage change. Student D was the only student in this section who experienced a decrease in percentage change from informal to formal assessments.

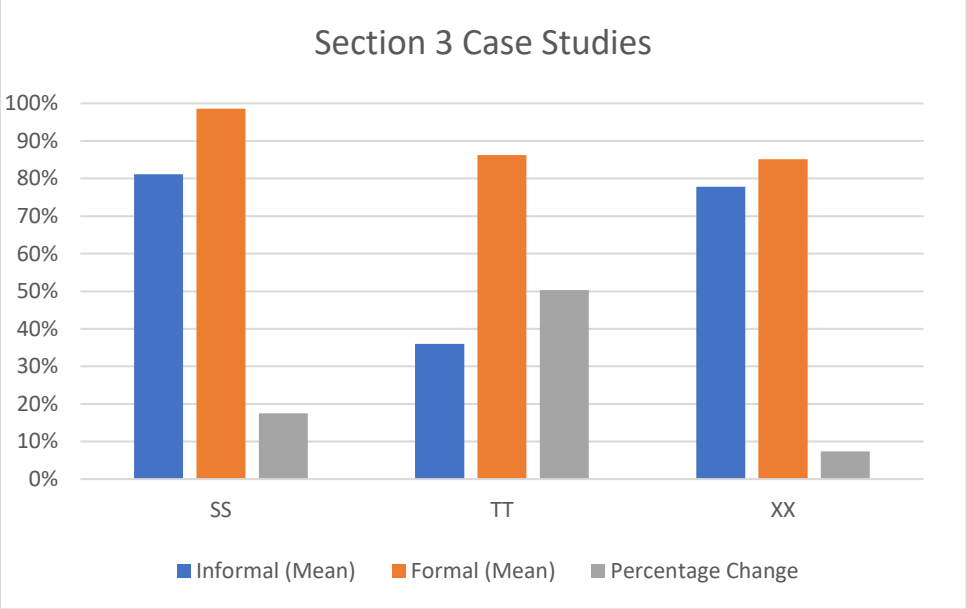

Figure 3.2 Section 3 case studies

Research Question 3: What type of feedback is more effective, immediate answer corrective feedback, or delayed answer corrective feedback?

When comparing the data from all three sections, more specifically, comparing immediate and delayed answer corrective feedback the first important piece to note is that all three sections were closely aligned on student achievement on the informal assessment scores. Informally, all three sections scored relatively the same (with minor variance) between the two methods used. Sections 1 and 2 both used Kahoot for their informal assessment and Section1 scored 65% on average over the eight-week study. Section 2

scored 66% on average, informally. Section 3, which used Quizizz as their method of informal assessment, scored 62% on average, informally. This information is displayed below, in blue, found on Figure 4.

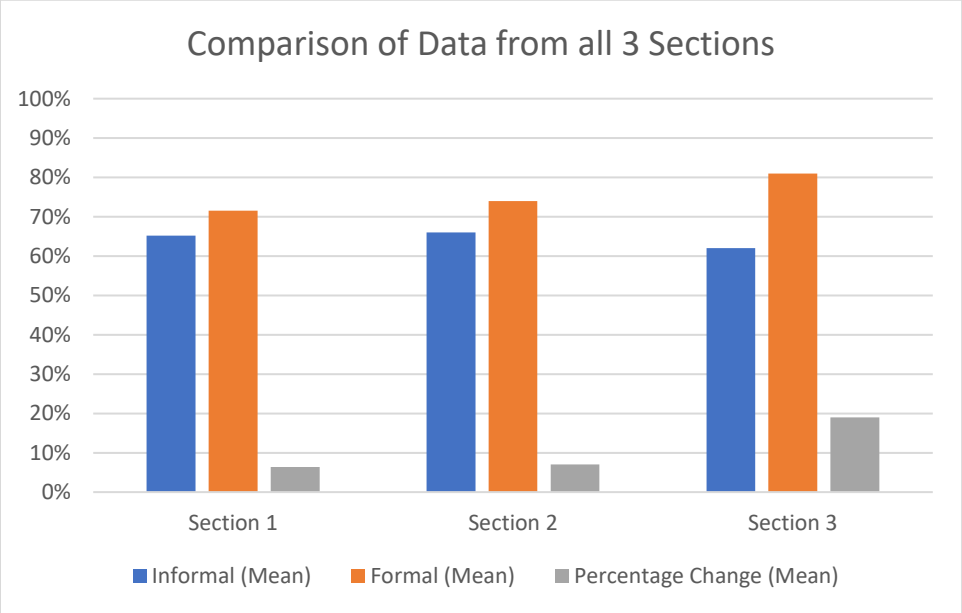

Figure 4 Comparison of data from all 3 sections

Although all three sections saw marginally different scores informally, formally there is a greater difference between the two sections which received immediate answer corrective feedback and delayed answer corrective feedback. Section 1 scored 72%, and Section 2 scored 74% on average on formal assessments. This group, who received immediate answer corrective feedback, showed consistency between the two sections (by scoring similarly on informal and formal assessment scores) did see increases in achievement formally, but not as great as that of Section 3. Section 3, the group who received delayed answer corrective feedback, scored 81% formally. This information is displayed in orange on Figure 4, above. Section 3 saw formal assessments score increases more than double in comparison to the sections receiving immediate corrective feedback. A comparison of the increases from informal to formal assessment scores for all three

sections is displayed above on Figure 4 and is depicted in gray. These data show that both immediate and delayed answer corrective feedback were found to positively impact formal assessment scores, and additionally, that delayed answer corrective feedback is more effective than immediate answer corrective feedback.

Conclusions. After examining the above data, it was determined that the hypothesis statement listed above was incorrect, as delayed answer corrective feedback was found to be more effective than immediate answer corrective feedback. Noting this, these results were not expected but will be beneficial for the study site when considering the use of Kahoot or Quizizz in the future.

Some considerations for this study are the differences between Kahoot and Quizizz as these differences may have unintended consequences on these data. Kahoot plays the informal questions on a SmartBoard, while Quizizz plays the questions on each student's iPad screen. Both require an iPad to respond, but because Kahoot uses the SmartBoard screen to project questions, this means students work through the informal assessments at the same pace. Upon observing students participate with both technological tools there was an evident difference in their engagement. While both groups appeared to be well engaged and interested, the manner which they reacted to each was unique. Students who used Quizizz 'played' their informal assessments quietly, and quietly took time with their delayed answer corrective feedback. (Meaning, they were spending time reviewing the informal questions and answers). Students who 'played' Kahoot appeared as if they were in an intense competition and wanted to 'win' amongst their peers. They would verbally respond to the immediate answer corrective feedback by saying phrases like, "yes!", or, "I got that one!", when they responded correctly. They

would use phrases like, “no!”, or “what?!”, when they responded incorrectly. These differences in the environment of each section may have impacted students’ future performance on formal assessments.

Considering these environmental factors, should this study be replicated in the future it would be best executed by using a single program that was exactly the same in design, but allowed for different types of feedback (both immediate and delayed answer corrective feedback) or students. Utilizing a program in this way would help eliminate environmental factors, or at least minimize differences between environments, which may have impacted the data collected in this study. Ideally, this study would be best conducted where each student could have their own space to take their informal and formal assessments, instead of all being in the same classroom. Although this would not replicate the 'average' high school classroom, this would help provide the best opportunity to accurately measure student performance on both their informal and formal assessments because environmental factors, and/or distractions would be minimized.

Additional observations include that this study supports the study of Shepard (2000) and Dannels, Gaffney & Martin (2008) in that direct feedback can support student learning since both types of feedback were found to positively impact their formal assessments. This is likely because students in both groups were given an opportunity to work with the material they were learning in a manner that they would later be assessed on. The informal assessments in this study gave students a base point to further prepare themselves for future assessments as confirmed by Pashler, Rohrer, Cepeda & Carpenter (2007). Meaning, overlearning was promoted by both types of feedback as the majority

of students improved from their informal to formal assessments due to their enhanced ability to recall content.

However, since both types of feedback were beneficial in this manner, this aligns with Brosvic, Epstein, Cook & Dihoff's (2005) ideas. Marsh, Lozito, Umanath, Bjork & Bjork (2012) stated how investigating the timing combined with the type of feedback used could be beneficial for educators who use feedback in their instructional practice. In this case, by investigating the two timings of feedback it was beneficial in finding that the delayed answer corrective feedback was found to be more effective than the immediate answer feedback.

Chapter 5

Implications for Practice

Action Plan. After studying and comparing the use of Kahoot and Quizzizz to provide immediate answer corrective feedback and delayed answer corrective feedback as interventions, I plan to use Quizizz as a reviewing method for the remainder of the 2018-2019 school year. This tool has been found to greater help students improve their formal assessment scores. One change I would make in continued implementation is to use it less frequently. Although implementing this weekly was beneficial for gathering data over a short period of time, I felt it was utilized too frequently. In the future, implementing this tool every other week would be ideal to avoid overusing the tool, while also using it frequently enough to benefit learning.

The goal of this study was to compare the immediate and delayed answer corrective feedback provided on informal assessments to formal assessments and both predominantly facilitated students in increasing their formal assessment scores, but the delayed answer corrective feedback (as delivered by Quizizz) was found more effective. Recognizing this, both tools are beneficial as a study tool in learning, but Quizizz may be better.

Plan for Sharing. My students have been asking about the results of this study. Many of them are college bound seniors and the idea of being a part of a study for a university has made them curious about what their ‘future of learning’ looks like. Sharing my findings in that both are effective in increasing their scores on their formal assessment and that Quizizz was found more effective in doing so will be interesting for them.

Previously, I noted that part of the reason I chose to investigate this topic was because of the sites goal of using technological tools as often as possible since the site provides iPad's for every student. Recognizing this, many teachers use Quizizz and/or Kahoot. Sharing this information with them could provide them insight as to the effectiveness of both tools and will compare the increased effectiveness of delayed answer corrective feedback that Quizizz provides. At our school we have tech sharing days every other month and I plan to share my findings with my colleagues and administrators at our next sharing day. Additionally, Quizizz and Kahoot are often shared at some of the tech conferences I frequently attend (EdCamp Bemidji, TIEs Minnesota) and given the appropriate opportunity I intend to share my results here as well.

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Appendix

APPENDIX A

District And Building Approval

BARNESVILLE PUBLIC SCHOOLS

INDEPENDENT SCHOOL DISTRICT #146

District Office 302-324 3rd Street South
PO Box 189 - Barnesville, MN 56514
Phone 218 354-2217 - Fax 218 354-7260
www.barnesville.k12.mn.us

"Commitment To Excellence"

September 4, 2018,

To Whom it May Concern,

This is a letter to grant Britta Teeples permission to conduct an action-research study at Barnesville School District during the 2018-19 academic year. I understand that this study poses no risk to those persons involved or to the Barnesville School District. I also understand that all information received will be kept confidential and will only be used for the purposes of this study.

Sincerely,

Bryan Strand

Principal, Barnesville High School

*Scott Loeslie, Superintendent *218 354-2217 *sloeslie@barnesville.k12.mn.us *
*Brooke Fradet, Administrative Assistant * bfradet@barnesville.k12.mn.us *
*Chris Ellefson, Community Education Secretary * cellefson@barnesville.k12.mn.us *
*Bryan Strand, High School Principal * 218 354-2228 * bstrand@barnesville.k12.mn.us *
*Todd Henrickson, Elementary Principal/Activities Director * 218 354-2300 *
thenrickson@barnesville.k12.mn.us *
*Pat Berndt, Finance Officer * pberndt@barnesville.k12.mn.us *

APPENDIX B

Parental Consent Form

BARNESVILLE PUBLIC SCHOOLS
INDEPENDENT SCHOOL DISTRICT #146
District Office 322-324 3rd Street South
PO Box 188 - Barnesville, MN 56514
Phone 218 354-2217 · Fax 218 354-7262
www.barnesville.k12.mn.us
"Commitment to Excellence"

Consent Form

Participation in Research

Title: The Effect of Feedback Given on Informal Assessments and its Continued Effect on Formal Assessments

Purpose: The purpose of this research is to determine which type of feedback (immediate answer corrective or delayed answer corrective) is more effective in helping students preform on formal assessments.

Study information: This study will anonymously compare student scores on informal reviews and it relation to the students score on a formal review (quiz or test). Some students will review and will receive immediate answer feedback, meaning after they provide a response to a questions they will see if they answered correctly or incorrectly. If they answered incorrectly they will see the correct response. Others will receive delayed corrective feedback, meaning they will receive correct responses after they complete the entire informal review.

Benefits: Participation may help improve future provided feedback to all social studies students enrolled in the World History course. This study may help improve student achievement.

Confidentiality: Participant's identity will not be shared with anyone beyond the principal investigator, Ximena Suarez-Sousa, and the co-investigator, Britta Teeples. All individual information will be recorded and tracked under and identification code rather than the participant's name.

Participation and withdrawal: Participation in this study is optional. Students can choose not to participate or choose to withdraw at any time without negative effects on grades, relationship with the instructor or Barnesville High School.

Contact: If you have any questions about the student you may contact any of these people:

Britta Teeples Co-Investigator	Ximena Suarez-Sousa, Ph. D. Principal Investigator
ph. (218) 354-2228 ext. 317	Assistant Professor, School of Teaching and Learning, Lommen 211C
Email: bteeples@barnesville.k12.mn.us	College of Education and Human Services Minnesota State University Moorhead
	ph. (218) 447-2007
	Email: suarez@mnstate.edu

*Scott Loeslie, Superintendent *218 354-2217 *sloeslie@barnesville.k12.mn.us *
*Brooke Fradet, Administrative Assistant * bfradet@barnesville.k12.mn.us *
*Chris Ellefson, Community Education Secretary * cellefson@barnesville.k12.mn.us *
*Bryan Strand, High School Principal * 218 354-2228 * bstrand@barnesville.k12.mn.us *
*Todd Henrickson, Elementary Principal/Activities Director * 218 354-2300 *

APPENDIX B, continued

BARNESVILLE PUBLIC SCHOOLS
INDEPENDENT SCHOOL DISTRICT #146
District Office 322-324 3rd Street South
PO Box 188 - Barnesville, MN 56514
Phone 218 354-2217 - Fax 218 354-7262
www.barnesville.k12.mn.us

Any questions about your rights may be directed to Lisa Karch, Ph. D., Chair of the MSUM Institutional Review Board, at 218-477-2699 or by lisa.karch@mnstate.edu. You will be given a copy of this form to keep.

"I have been informed of the study details and understand what participating in the study means. I understand my child's identity will be protected and he/she can choose to stop participating in the study at any time. By signing this form, I am agreeing to allow my child to participate in the study. I am at least 18 years of age or older."

_____

Name of Child (Print)

_____

Signature of Parent/Guardian, Date

_____

Signature of Investigator, Date

Thank you,

Britta Teeples

Social Studies Teacher

Barnesville High School

*Scott Loeslie, Superintendent *218 354-2217 *sloeslie@barnesville.k12.mn.us *
*Brooke Fradet, Administrative Assistant * bfradet@barnesville.k12.mn.us *
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*Pat Berndt, Finance Officer * pberndt@barnesville.k12.mn.us *

APPENDIX C

Method of Assent

Method of Assent

I will explain to the 12th grade students that "your parents have given permission for you to participate in a research project that I am conducting. You may choose to not participate if you do not want to. Should you choose not to participate in this study there will be no effect on your grade, meaning you will receive no penalty for choosing not to participate. This study is totally voluntary. The effect of this study is to help me determine the most effective type of feedback given and how it impacts your scores on formal assessments (quizzes and tests). Should you participate, you will participate in class as usual and data will be collected on your informal review scores and formal assessment scores to determine what feedback is best for the future. Are there any questions?"

APPENDIX D

Section 1 Cumulative Data from Microsoft Excel

Name	Informal (Mean)	Formal (Mean)	Percentage Change
A	49%	60%	12%
B	80%	85%	5%
C	72%	74%	3%
D	74%	73%	-1%
E	71%	82%	11%
F	70%	74%	4%
G	57%	71%	14%
H	73%	77%	4%
I	72%	78%	6%
J	59%	61%	2%
K	57%	63%	6%
L	53%	55%	2%
M	60%	66%	6%
N	56%	79%	23%
O	60%	64%	4%
P	75%	82%	7%
Q	72%	74%	3%
Section 1 Overall	**65%**	**72%**	**6%**

APPENDIX E

Section 2 Cumulative Data from Microsoft Excel

Name	Informal (Mean)	Formal (Mean)	Percentage Change
R	91%	98%	6%
S	78%	84%	6%
T	60%	77%	17%
U	58%	55%	-3%
V	63%	80%	17%
W	50%	44%	-6%
X	59%	71%	12%
Y	67%	69%	2%
Z	73%	76%	4%
AA	60%	78%	18%
BB	76%	84%	8%
CC	50%	66%	16%
DD	58%	74%	16%
EE	84%	87%	3%
FF	75%	73%	-2%
GG	61%	64%	3%
HH	73%	80%	8%
II	58%	65%	7%
Section 2	**66%**	**74%**	**7%**

APPENDIX F

Section 3 Cumulative Data from Microsoft Excel

Name	Informal (Mean)	Formal (Mean)	Percentage Change
JJ	81%	88%	7%
KK	42%	77%	35%
LL	38%	71%	33%
MM	56%	63%	8%
NN	83%	85%	1%
OO	66%	73%	8%
PP	59%	88%	29%
QQ	53%	75%	21%
RR	71%	86%	15%
SS	81%	99%	18%
TT	36%	86%	50%
UU	40%	49%	9%
VV	50%	70%	20%
WW	61%	55%	-6%
XX	78%	85%	7%
YY	50%	89%	39%
ZZ	63%	90%	27%
AAA	67%	90%	23%
BBB	89%	94%	5%
CCC	67%	95%	28%
DDD	46%	82%	36%
EEE	52%	67%	16%
FFF	73%	98%	24%
GGG	84%	89%	5%
Section 3	**62%**	**81%**	**19%**

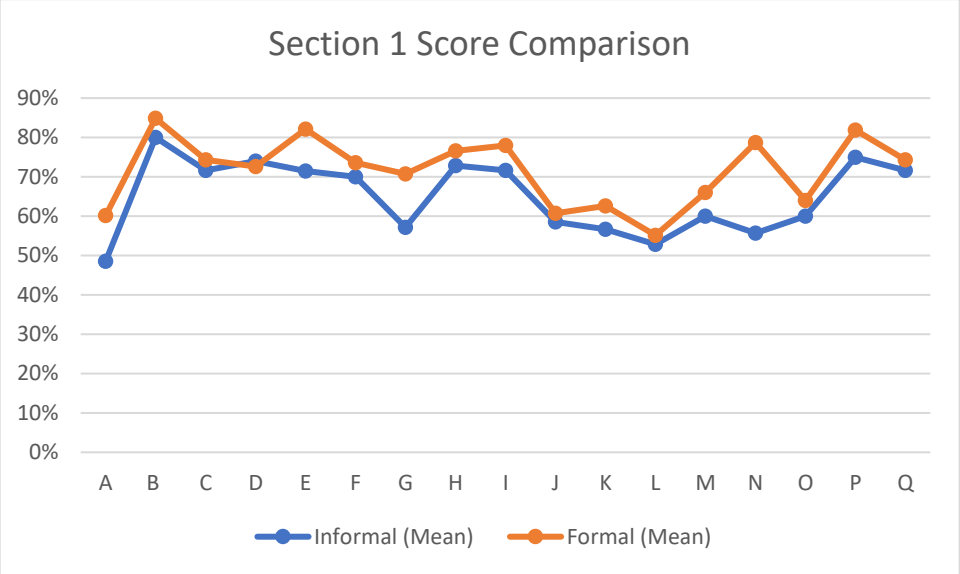
APPENDIX G

Summative Cumulative Data from All 3 Sections

Name	Informal (Mean)	Formal (Mean)	Percentage Change (Mean)
Section 1	65%	72%	6%
Section 2	66%	74%	7%
Section 3	62%	81%	19%

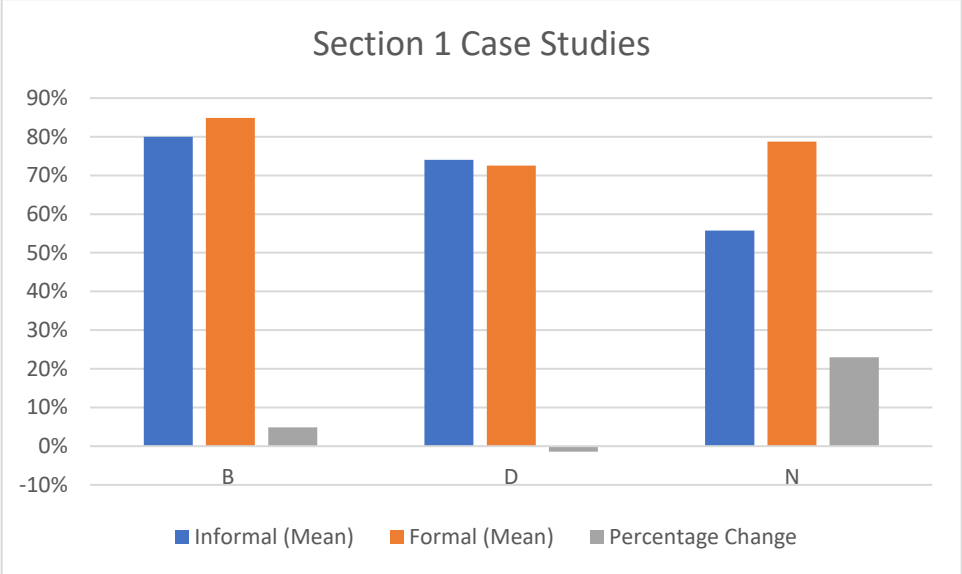
APPENDIX H

Figure 1.1



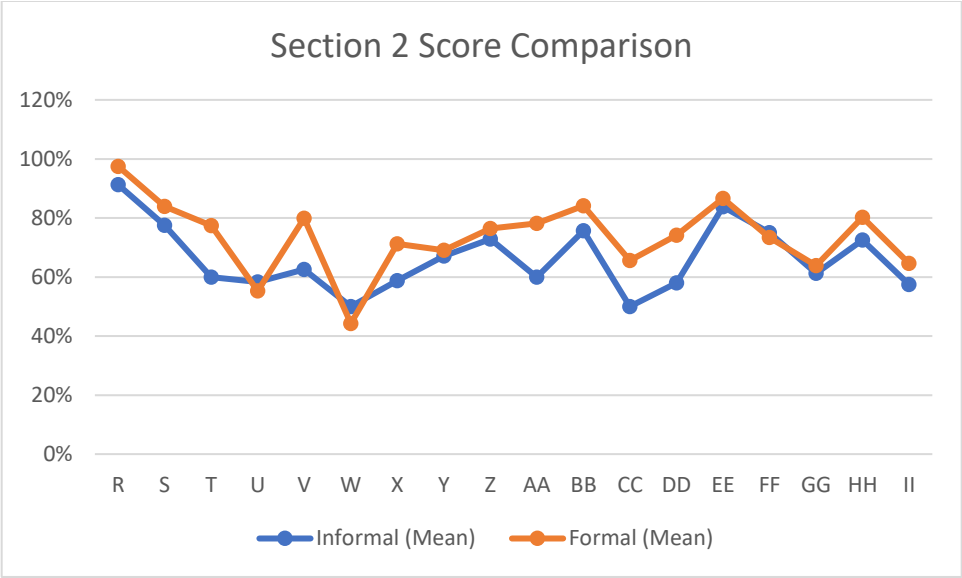
APPENDIX I

Figure 1.2



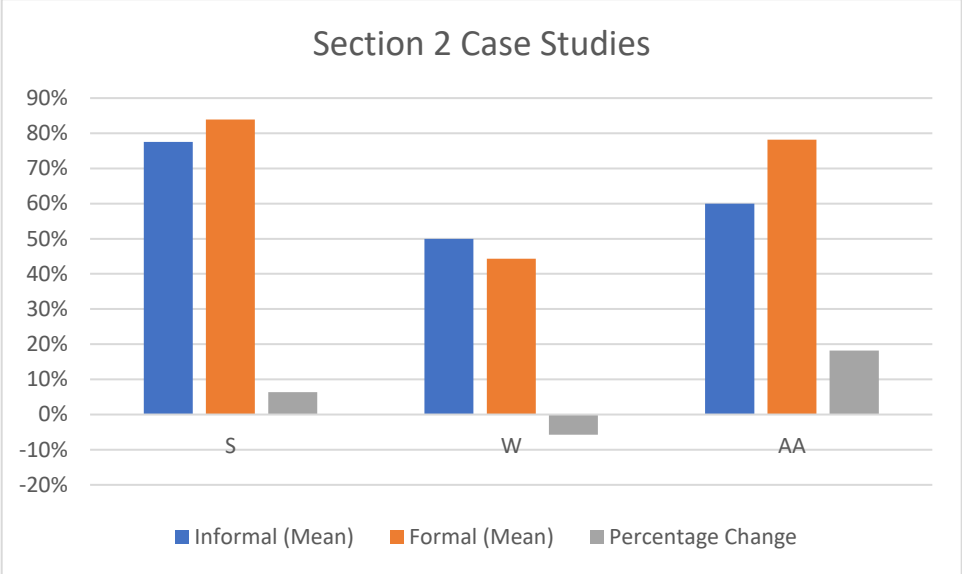
APPENDIX J

Figure 2.1



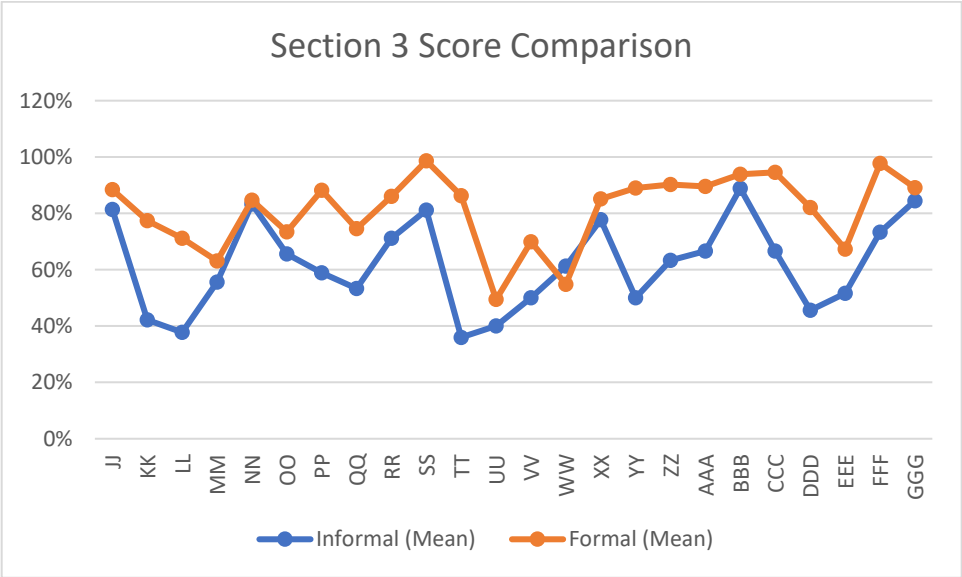
APPENDIX K

Figure 2.2



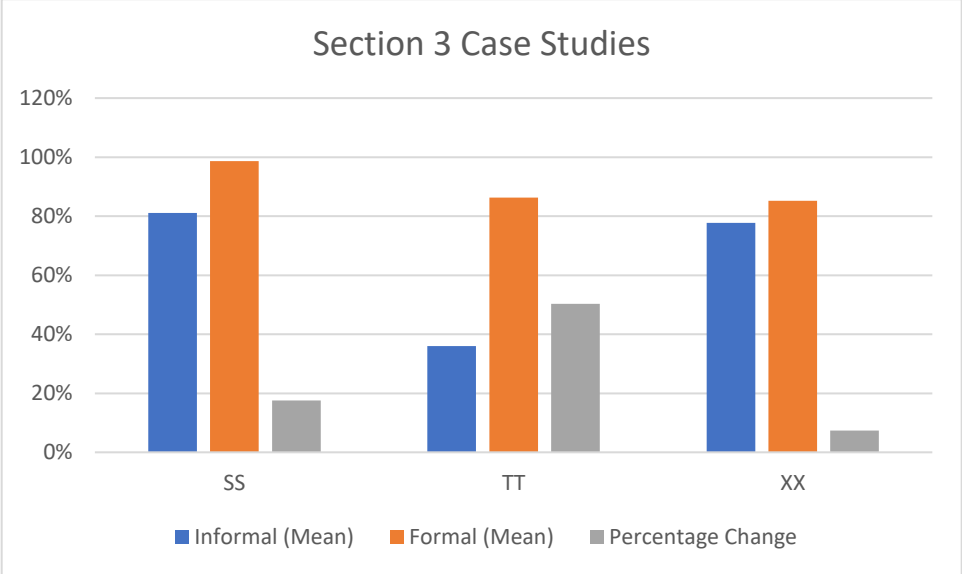
APPENDIX L

Figure 3.1



APPENDIX M

Figure 3.2



APPENDIX N

Figure 4