

Action Research Proposal

Ryan Cryderman

American College of Education

RES5153 – Research Methods

Dr. Harold Fisher

August 10, 2022

Introduction

This past school year marked my tenth year in education where I currently teach mathematics at the middle school level. Ten years of teaching has afforded me the opportunity to interact with diverse student populations and to teach in every grade level 6-12. Teaching in each grade has allowed me to understand the Common Core progression, which has been a great resource for my students. In the school district I teach in, we use a summative assessment called the NWEA (Northwest Evaluation Association) several times a school year to measure student growth and proficiency. The district uses the data from the assessment to do the following things: Place students in specific classes to meet their academic needs, provide teachers an understanding of the strengths and weaknesses of the students they teach, and use the data to create an individualized education plans for students in Khan Academy. If used correctly, the NWEA test is a wonderful resource that allows educators to gain a deeper understanding of the academic abilities of the students they teach, and they can use the data to meet the needs of each individual student.

Problem Statement

The problem is it is difficult to formatively assess students frequently enough to collect data to drive instruction and provide students with meaningful feedback. Interventions are very important to my teaching practice. According to Air.org, students who fail Algebra I are less likely to graduate on time or graduate at all (Clements, Heppen, Rickles, Sorensen, Taylor, Walters, 2017). A study done in Chicago Public Schools in 2007 by Deborah Thompson addresses this issue. Researchers realized most students who fail Algebra I enter high school with math deficits. The study concluded by saying the following, “Interventions that focus on

preventing course failures and improving school engagement may be more critical for the most at-risk students than merely giving them the opportunity to retake a course” (Thompson, 2007).

As a math teacher and private tutor, parents often tell me their child gets all A’s on their homework but when it comes to an assessment they fail. How can that be? Math is a subject that focuses heavily on practice and repetition. Math teachers assign a lot of homework; very rarely do they give authentic feedback because it is nearly impossible to do. It is very difficult for a teacher to grade and give feedback on a couple thousand problems each week. Most students have people at home who can help them, they generally have a pretty good number sense, and they are motivated enough to keep working at it. If the students do not possess all three of the items I have listed, they at least have a combination of the three. Most at-risk students lack all three of the items I have mentioned. These students have a very difficult time passing their math class and become at-risk for dropping out of school. In the school district I teach in, the Algebra I failure rate is higher than the district would like it to be. Why is the Algebra I failure rate as high as it is? What can elementary and middle school math teachers do differently to prepare students for Algebra I? Public educators need to address this problem to ensure every student reaches their potential and graduates high school.

Purpose Statement

The purpose of the research project is to address the rising failure rates in Algebra I and the students who are not graduating from high school. This generation and future generations will be competing for employment in a global market place and the need for higher education is more important than ever. Students who do not graduate high school are at an extreme disadvantage. The action research study will aim at decreasing the Algebra I failure rate in hopes to increase the high school graduation rates and enrollment in higher education.

Research Questions

The action research study will focus on the following question. What effect will frequent formative assessments have with at-risk middle school students on their NWEA math score?

The action research study will also address the following questions. How can formative assessments help the teacher understand what common misconceptions students have? How will frequent formative assessments drive instruction in the classroom? The table below outlines the problem statement, purpose statement, and research questions for the action research study.

Table 1: Problems Statement, Purpose Statement, and Research Questions

Problem Statement	Purpose Statement	Research Questions
The problem is it is difficult to formatively assess students frequently enough to collect data to drive instruction and provide students with meaningful feedback.	The purpose of the research project is to address the rising failure rates in Algebra I and the students who are not graduating from high school.	<i>Research question 1:</i> What effect will frequent formative assessments have with at-risk middle school students on their NWEA math score? <i>Research question 2:</i> How can formative assessments help the teacher understand what common misconceptions students have? <i>Research question 3:</i> How will frequent formative assessments drive instruction in the classroom?

Literature Review

Over the course of my teaching career, I have been given the opportunity to work with students who struggle greatly in math. The school district I teach in places a maximum of 20 students per grade in math enrichment classes, which allows the teacher to build relationships with each student to better understand why they are in the class. I have realized there are a plethora of reasons why students enter this class but there are two reoccurring themes; students

lack confidence in themselves and students lack number sense. In the district I teach in, summative assessments are given in ELA and mathematics several times a year in elementary school; however, I am not sure what interventions are in place to address students falling below grade level. As the field of education evolves, so does the teaching strategies and available resources teachers have at their disposal to meet the needs of their students. Based on my classroom experience, if the majority of assessments given in a classroom are summative, the higher the chance students fall behind. As I thought about my research project, I knew I wanted to address the lack of frequent formative assessments taking place in math classrooms. This project will focus on the effect frequent formative assessments have with remedial math middle school students on their NWEA math scores. If the use of frequent formative assessments has a positive impact on NWEA scores, this, in turn, will hopefully help more students successfully pass Algebra I when they get to high school.

The successful completion of Algebra hinges on a strong mathematical foundation from elementary and middle school. Mathematics is a subject that continuously builds upon itself; if students have learning gaps in their mathematical reasoning and computation, it will make more challenging to successfully complete Algebra I. The majority of students who do not pass their Algebra I class are deficient in one or more mathematical domains from their K-8 learning. Credit recovery and taking remedial math classes are options for students to master the content but educators should do their best to prevent failure in the first place. One way this can be done is through improving school engagement in math classrooms (Clements, P., Heppen, J., Rickles, J., Sorensen, N., Taylor, S., & Walters, K., 2017). Project-based learning, cooperative learning, and interactive assessments are ways to improve student engagement, which could improve student learning.

All teachers agree that formative assessments are beneficial to their students. However, teachers may not use formative assessments as frequently as they should for a few different reasons. First, frequent formative assessments take away valuable instruction time. Teachers feel the pressure of trying to get in all the Common Core State Standards in before the state assessment each school year. Secondly, these assessments often take a while to create. Teachers invest a great deal of time trying to create engaging lessons for the multiple classes they teach and cannot afford to sacrifice some of this time to create formative assessments each week. Lastly, frequent formative assessments take a long time to analyze. Teachers have a limited amount of time each evening. In addition to lesson planning, teachers are constantly grading assignments; therefore, creating and analyzing formative assessments usually takes a back seat in the classroom.

If formative assessments are used in the classroom, they must be analyzed quickly to determine if instruction needs to be changed. According to William Black, “The biggest instructional payoffs occur when teachers use “short-cycle” assessments, in which test results are available quickly enough to enable teachers to adjust how they're teaching and students to alter how they're trying to learn” (as cited by Black, Popham, 2006, pp. 28). Kathleen Duddek Rowlands adds to this saying, “If the results don't get back in time for teachers to adjust instruction for the students being assessed, then it's not formative assessment” (as cited by Rowland, Popham, 2006, pp. 34). There are benefits when teachers use effective formative assessments to drive classroom instruction, but teachers must quickly review these assessments to make the necessary instructional changes the following day. The idea of formatively assessing students twice a week seems daunting for most teachers due to the sheer amount of time that needs to be dedicated to the task. However, recent technological advancements in the

field of education are helping teachers quickly and effectively assess their students. These assessments do not take a lot of time to create nor analyze and they could make positive impact in classrooms (Popham, 2006).

Technology not only allows teachers to gather authentic feedback from their students but it also engages students in the learning process. Classroom response systems (CRS) through the use of technology-enhanced formative assessments (TEFA) provides data supporting this idea. In the traditional classroom, teachers will try to engage students by asking questions but usually get the following; no one in the class raises their hand to or the same few kids raise their hand to answer the questions. Strategies such as numbering popsicle sticks and assigning students a number is one way to ensure students are paying attention and are held accountable. This strategy, however, does lend itself to creating anxiety in the classroom by individually calling on one student who may struggle on that particular concept. Formative assessments through classroom response systems remedy this concern. Beatty and Gerace's study states, "One crucial feature of CRSs is that they simultaneously provide anonymity and accountability: students can be (formally or socially) held accountable for answering questions, but the actual answer each student has chosen is not revealed to other students and is not immediately obvious to the teacher" (Beatty & Gerace, 2009, pp. 148). Research conducted by Marshall Fies supports this idea too. His research identified several benefits CRS offer; one of these benefits is an increase in student engagement and participation (as cited by Fies, Beatty & Gerace, 2009). When teachers use formative assessments in conjunction with technology several times a week, teachers get real-time data that can drive future instruction and create rich discussion within the classroom.

One way to use technology to formatively assess students is through the use of Plicker Cards. Plicker Cards are a very inexpensive way to collect authentic data while increasing classroom participation. Each Plicker Card has an image on it similar to a QR code. Each image is unique to the student yet very similar to the rest of the class to create anonymity. Teachers create multiple choice questions or surveys within the Plicker Cards program to display the questions or surveys to the class. Students will come up with their answer and hold up their Plicker Card; the teacher will use the camera on a smart device to record the data. The data will be sent to the Plicker Card website for teachers to analyze on the spot. The data can be exported to a Microsoft Excel document for further analyses. As teachers and students become more familiar with this tool, formatively assessing students less burdensome. Kudryavtsev, Krasny, Ferenz, & Babcock (2007) observed that “If used efficiently, technology can allow educators to engage learners in critical thinking, quickly check learners’ understanding, and collect data as learners advance through their program” (as cited in Thompkins, Howell & Mull, 2018, pp.1). In 2007, Timothy A. Wood, Ph.D.; Kweku Brown, Ph.D.; J. Michael Grayson, Ph.D., faculty members at The Citadel, The Military College of South Carolina, introduced Plicker Cards in their classrooms. They found that one benefit of using Plicker Cards was opening the lines of communication between instructors and students; students were more alert in class and actively took part in the learning process. One instructor asked similar questions several times throughout the lecture; one time in the beginning, once in the middle, and once at the end. This allowed the instructor to see if students were comprehending the material or if he needed to explain it in a different way. Another instructor used Plickers Cards to see if students retained the material presented to them the day before. Citadel students were surveyed on Plicker Cards and here were their responses. Knowing there would be a question at the beginning of class

based on the previous days lecture, 92% of students said they review their notes from the day before. Survey results show 96% of students said Plicker Cards encouraged active participation in class and 88% of students hoped other instructors would use Plicker Cards in their classroom. Another question asked students if they preferred using Plicker Cards against other quiz taking methods such as pencil and paper and 83% said yes (Wood, Brown & Grayson, 2017, pp. 2-7).

Another way to formatively assess students using technology is through the web-based program Kahoot!. Kahoot! is a free, student response system program that allows students to actively engage in the lesson while a teacher collects real-time data. Kahoot! allows students to demonstrate their understanding through a game-like format; students need a smart device to access the game. Teachers can either create or use an existing quiz, discussion, or survey to assess student understanding on a particular topic. Dellos, the author of, *Kahoot! A Digital Game Resource for Learning* said, “Students and educators benefit from Kahoot! by engaging students in their introduction of new content or the review of old content. Data can be collected and reviewed as an excel document to gauge students’ understanding of content” (Dellos, 2015, pp. 49-50). With the recent phenomena of social media and online gaming, students are becoming more and more reliant on their devices. In another article that references Kahoot!, the authors discuss the social aspect that goes along with this assessment. The authors state, “Furthermore, the social connection enabled by cooperative learning experiences constitutes one of the key points that support the gamification of learning” (Baldeon, Johan, Puig, Rodriguez, Immaculada, Lopez, Grau, Escayola & Montserrat, 2015, pp. 3-4). Kahoot! uses a game-based platform to allows students to interact with one another all while allowing teachers to efficiently assess their students. The game-based program disguises a traditional worksheet and reinvents it in a fun, engaging format.

Padlet is another way to formatively assess students using technology through the web-based program. Traditional pencil and paper exit tickets often had a space for students to answer the question, what questions do I still have? This feedback is priceless for teachers as it helps teachers gauge the specific needs of a class. As previously mentioned, pencil and paper exit tickets take a lot of time to create and analyze; Padlet is an easier, efficient way to accomplish the same idea. Padlet creates an online platform where a teacher can post a question or comment and students, using a smart device, can simultaneously post responses. A study conducted by Cynthia Kleinsmith at Rowan University looks at the effects of using Padlet on the academic performance and engagement of students in a fifth-grade basic skills mathematics classroom. In her dissertation, she says, “Marino and Beecher (2010) recommend that teachers embrace the power of technology as a strategy to support at-risk students in increasing engagement and academic performance” (as cited in Kleinsmith, 2017, pp. 14). Padlet allows teachers to create an environment that promotes rich classroom discussion, anonymous, authentic feedback, all while collecting valuable classroom data on a specific topic. Through her research and classroom surveys, data may suggest an increase in both academic scores and engagement but further research needs to be conducted. She states that engagement increased in more than half of her students and the weekly mean academic score for exactly half of her students (Kleinsmith, 2017).

In addition, teachers can assign a small, in-class assignment to understand why students are struggling, assess work, and provide feedback. In 2013, Kehrer, Kelly & Heffernan completed a study in a suburban middle school in Massachusetts. During the study, 65 seventh grade students participated to determine if immediate feedback while doing homework would improve learning. If immediate feedback does impact learning, how large of an effect does it

have in the classroom? Students were broken into two groups; one group received immediate feedback and correctness while doing an assignment while the other group received feedback and correctness the following day. Students were given a pre-test and would be given a post-test at the end of the study. At the end of the study, the students who received immediate feedback performed 12% better than students who received feedback the following day. The article states, “Without immediate feedback, students practice the skill incorrectly and must then re-condition their thinking once feedback is given” (Kehren, Kelly & Heffernan, 2013, pp. 4). This study confirms that investing time in-class to provide feedback and confirm if answers are correct will have a positive impact on learning.

Teachers can also give weekly quizzes to identify where students are struggling on a particular topic. Valeh Gholami (2013) conducted a study on the effect of weekly quizzes on students’ final achievement score. Proponents of weekly assessments say frequent assessments help students retain information for extended lengths of time, students are more likely to attend school knowing there will be a quiz each week, and students are likely to do better on the quizzes as they are more manageable because they cover smaller amounts of materials. Conversely, frequent assessments can have a negative effect on learning. Opponents believe weekly quizzes take away from valuable classroom instruction time, teachers and students solely focus on the quizzes and lose sight on the big picture, and students eventually become uninterested in the quizzes (Gholami & Maghaddam, 2013). In this study, 70 students were split into two groups; one group took weekly assessments and a midterm exam while the other group just took the midterm exam. Students were given ten tests created by the researchers as well as a summative assessment. At the end of the study, the data showed that students who did have weekly quizzes did score better on the final assessment compared to students who just took the final assessment.

This concept ties closely together with another concept called sustained learning over time. The idea of reinforcing an idea over a long duration will help students transition new concepts from their short-term memory to their long-term memory.

This literature review has been very eye opening to me when it comes to formative assessments. I can truly say that I learned about my own style of teaching and how I assess my students. Mathematics is a subject that so many students are intimidated by and lack confidence in. Based on my research, if technology is used correctly in the classroom, two-way dialog between teachers and students can exist and will hopefully alleviate anxiety when it comes to math and help to rebuild confidence. If students have a strong number sense and have a good grasp of mathematical concepts from elementary and middle school, this will increase the likelihood of successfully passing their high school math classes and graduating high school.

Methodology and Design

The purpose of the research project is to address the rising failure rates in Algebra I and the students who are not graduating from high school. A 2008 study conducted by the American Institutes for Research determined that students who didn't successfully pass Algebra I by the ninth grade had a 50% chance of not graduating high school. A 2016 study conducted by the American Institutes of Research found that student who failed both semesters of Algebra I had a 15% chance of graduating high school in four years (Yoder, 2022). It is important for educators to determine the root causes for high Algebra I failure rates. The action research study will help educators implement best practices to ensure each student successfully passes Algebra I and continues on to graduate high school.

A mixed method approach will be implemented in the action research study. The action research will use a combination of quantitative and qualitative data, which will allow the researcher to view and analyze the problem from different perspectives. This is important because there likely is more than one reason students are failing Algebra I. The mixed method approach will hopefully enlighten the researcher and bring to light these reasons for the high failure rate.

The following research question will guide the action research study: What effect will frequent formative assessments have with at-risk middle school students on their NWEA math score?

A mixed method approach in data collection will help add credibility and authenticate the action research study. The use of a standardized test as the baseline to determine growth is critical. The NWEA test will act as a pre-test and post-test to determine growth during the action research project. According to the NWEA, “Similar to other linking studies, the SAT College Readiness Benchmark study correlates student RIT scores with future scores on a particular test (in this case, the SAT)” (NWEA Connection, 2022). This is important as the purpose of the action research study is to reduce the number of students failing Algebra I. The researcher will use data from the formative assessments to gauge understanding and drive instruction throughout the project. The researcher will also get direct feedback from students as this is important to their personal success. The feedback the researcher will get from students will be collected through surveys and face to face interviews; this insight will help the researcher improve classroom instruction, classroom activities, and formative assessments. Lastly, the researcher will journal classroom observations. This will allow the researcher to cross reference the data from the assessments and the observations (American College of Education, 2022). A mixed method

approach will allow the researcher to collect and analyze a diverse data set, which will help the researcher answer the action research question.

A mixed method approach uses a combination of quantitative and qualitative methods to collect data. The collection of quantitative data includes methods such as formative and summative assessments, experiments, and surveys; the collection of qualitative data includes methods such as face to face interviews, focus groups, and observations (Chalmers & Cowdell, 2021). According to Allison Shorten, “Mixed methods research draws on potential strengths of both qualitative and quantitative methods, allowing researchers to explore diverse perspectives and uncover relationships that exist between the intricate layers of our multifaceted research questions” (Shorten, 2017). Allison Shorten talks about the intricate layers within the research question; in the creation of the research question and problem statement, the researcher assumed there were probably several reasons why students failed Algebra I. Using a mixed method approach will allow the researcher to collect data through several different perspectives, which will hopefully bring to light some of these reasons.

By understanding why students fail Algebra I, it is important to come up with strategies and interventions to address this problem. The research question and secondary questions in the action research study intends to address the high failure rate. The use of frequent formative assessments will hopefully have a positive effect on student learning and success in Algebra I. A mixed methods approach will help the researcher determine, not just whether the use of frequent formative assessments will positively impact student learning, but how, why, and for whom (*Why Mixed Methods?*, n.d.). A mixed methods approach will give the researcher a thorough understanding if the strategies used in the action research project were successful.

Population, Sample, & Professional Setting

The target population for the action research project is at-risk middle school students. If a student is identified as an at-risk student in middle school, it is more likely that student will struggle in Algebra. Identifying these students early and implementing different interventions could prevent course failures, which could be more beneficial than retaking the course or credit recovery (Clements, P., Heppen, J., Rickles, J., Sorensen, N., Taylor, S., & Walters, K., 2017). In the researcher's district, NWEA results are used to determine which students considered at-risk in mathematics and ELA. One intervention for at-risk math students is a math support class; an at-risk math student will take this class in addition to their regular math class. Unfortunately, there are more students who are identified as at-risk at math than available seats in the math support class based on the NWEA result. The sample that will be used in the action research study will be students who are placed in the math support class at Middle School Alpha, which is 20 students. Since all the students in the action research study are in the same class, it will be easier for the researcher to conduct the study.

Data Collection Plan

The purpose of the action research project is to determine what effects frequent formative assessments will have on math support students' NWEA scores. Students will take the NWEA test in fall and again in the winter. The results from the fall and winter assessments will be put into a Microsoft Excel file (APPENDIX A). This will be the main data source to see what effects, if any, frequent formative assessments have on student learning. Students' NWEA fall scores will be used to determine which concepts the class, as a whole, are below grade level on; the class scores will be averaged to determine which concepts to focus on. Small units will be created to address these areas of concern.

Students will be given a pre-test and a post-test each unit to determine mastery proficiency; data will be collected through these assessments and stored in one Microsoft Excel file (APPENDIX B). These will be the two different summative assessments used during the action research project. Within each unit, several formative assessments will be used on a weekly basis. The formative assessments used in the action research study, Kahoot, Plicker Cards, Padlet, in class homework assignments, and weekly quizzes will drive instruction and determine what interventions, if any, need to be implemented. If re-teaching is necessary, students will be grouped according to the data. Students who are proficient will work on an enrichment task while other groups will have lessons designed to meet their needs to help them become proficient. Kahoot and Plicker Cards are platforms that collect data and can be exported to Microsoft Excel. In class homework assignments as well as weekly quizzes will be graded and input into the Microsoft Excel file with the other formative assessments (APPENDIX C). Data will be collected through all these assessments and stored in one Microsoft Excel file. With all the data in one location, the researcher will be able to analyze the data to determine future instruction. All three of these methods are forms of quantitative data.

The researcher will also use other forms of quantitative and qualitative data in mixed method approach that will be implemented in the action research study. Student surveys will be given throughout the action research project. The survey will ask students to respond to questions on a five-point rating scale as well as opened ended questions. The researcher will also conduct face to face interviews with each student in the sample group. The researcher will ask opened ended questions that relate to content taught in the class, feedback on the different types of assessments, and students overall confidence level in mathematics. The face to face interviews will be done at the beginning and end of the study.

The researcher will compile and analyze the data to determine what effects, if any, frequent formative assessments have on student learning. This will be evident in the fall and winter NWEA test scores as well as the pre-test and post-test for each unit. The data from the formative assessments will dictate how the researcher proceeds on a daily basis. If re-teaching is necessary, students will be grouped according to the data. Students who are proficient will work on an enrichment task while other groups will have lessons designed to meet their needs to help them become proficient. The researcher hopes that the use of frequent formative assessments will positively impact students' confidence and mastery of fundamental mathematical concepts.

Data Analysis Plan

Based on the various methodologies available, the researcher will collect data for the action research study by using a mixed methods approach in which both qualitative and quantitative data are used. Using quantitative data such as NWEA scores and formative assessment results, there are multiple ways of collecting measurable data to help drive instruction. The researcher will use quantitative data such as personal accounts and feedback from other math teachers to see how to better serve students in math classes. The researcher will also survey students throughout the year to improve assessments and instruction. This will help the researcher address the purpose of the action research study, which is address the rising failure rates in Algebra I and the students who are not graduating from high school. The researcher will have students work in small group; the discussions will be student lead with the researcher being the facilitator. In this role, the researcher will play more of an observer; if a group needs help, the researcher will pose a few questions to get the group heading in the right direction. This style of teaching relates closely to the research design strategy ethnography.

As mentioned previously, a mixed method approach in data collection will help add creditability and authenticate the action research project. The use of a standardized test as the baseline to determine growth is critical. The NWEA test will act as a pre-test and post-test to determine growth during the action research project. According to the NWEA, “Similar to other linking studies, the SAT College Readiness Benchmark study correlates student RIT scores with future scores on a particular test (in this case, the SAT)” (NWEA Connection, 2022). This is important as the purpose of the action research project is to reduce the number of students failing Algebra I. The researcher will also use data from the formative assessments to gauge understanding and drive instruction throughout the project. The researcher will also get feedback from students as this is important to their personal success. The feedback the researcher obtains from students will help improve future formative assessments given as well as the instruction and class projects. Lastly, the researcher will document interactions to assist in the data collection; creating a detailed field journal will allow the researcher to triangulate the data from the assessments and the observations made (American College of Education, 2022).

Implementation Action Plan

The content students will learn throughout the action research project will be based on NWEA data. The researcher will collect NWEA data from all participants and analyze the data to determine the learning needs of the class. The researcher will design units based on the content the class, as a whole, is deficient in. Students will be given a pre-test and a post-test each unit to determine if the concepts taught were mastered.

Within each unit, students will be formatively assessed twice a week. The researcher will use Kahoot, Plicker Cards, Padlet, in class homework assignments, and weekly quizzes to gather data. The data from each assessment will help the researcher determine what interventions, if

any, are needed to reteach content or continue in the unit. Throughout the action research study, the researcher will survey students; surveys will ask students about content as well as the formative assessments used. The researcher would like to know if the formative assessments are authentic, engaging, and helpful to the students. The researcher will meet one-on-one with each student. This will provide students another way to demonstrate their learning and share their thoughts on the action research study.

The data collected throughout the project will provide the researcher real-time data to help students throughout each unit and hopefully answer the action research question. It is important for the researcher to make all decisions throughout the action research study based on data. By making data-driven decisions, it will produce a reliable and valid study that will allow the researcher to share accurate information with all stakeholders.

Communication Plans

The appropriate audience to share the data from the action research study would be building administration. The action research study hopes to positively impact student NWEA scores, improve student engagement, and help teachers efficiently and effectively assess their students. If the data supports this, it would be important to share with the teaching staff as well. Future professional development sessions could be centered on the formative assessments used to collect data. As an educator, it is important to professionally collaborate with other educators to discuss best practices and learn new technology (Gates, n.d.).

There are several items from the action research study researchers would share with administration and staff through a short PowerPoint presentation. It should start with a 30 second elevator pitch on what the action research entailed. The presentation would follow that up with a

short summary of the different assessments used to collect the data. Following this, the data collected from the study and the conclusions drawn would be shared as well as student feedback throughout the study; data collected in surveys and one-on-one interviews. It is important for administrators and teachers to see the study from the researcher's perspective and from the students' perspective. If the study had a positive impact on student learning, it is important to share the findings in hopes to inspire other teachers to try this in their classroom.

Reliability, Validity, and Ethics

The action research study must be ethical and produce results that are reliable and valid in order to share the results and implement them. A consent form that informs parents why research is being conducted has been created and asks for their permission to use the data in this report. The consent form will be given to students to take home and emailed as well if an email address is on file; the researcher will be available to talk on the phone or in person if a parent has additional questions.

Confidentiality, record keeping, and data management are imperative for the success of the action research project. Each student will be assigned a number along with a code word to use during the project; this will allow students to remain anonymous in order to submit authentic data. All information collected will be stored in two places. Hardcopies will be kept in a locked file cabinet and will also be scanned as a PDF and saved to a flash drive. All data will be destroyed once the action research study is complete (U.S. Department of Health, Education, and Welfare., 1979).

Throughout the action research project, the researcher will try to identify and rectify potential risks before they occur in addition to supporting each student throughout the project. In

order to get accurate data, each student must feel safe participating. Each student will be given a number as well as a code word to use on assessments to remain anonymous. If any of the numbers or code words are compromised, a new set of code words and numbers will be distributed to the class. The researcher will be available to talk with each family to discuss the project in more detail and reassure the family that participation in the project will not positively or negatively affect the student's grade. If a student chooses not to participate in the data collection, the student will still be given a number along with a code word to participate in the classroom instruction. This will allow the student to still participate and not feel left out. Some of the assessments require the use of technology. Each student will be given the exact same resources so no one feels inferior; students will be provided I-Pads and all required supplies. Some of the assessments will take several tries for students to understand how to use them. Students will use these assessments through get-to-know-you activities in the beginning of the year to become familiar with them.

Several different types of formative assessments will be used to collect valid data. One way to ensure validity is to have all assessments completed in the classroom. Students will not be given assessments to take home to ensure each assessment is completed by that particular student. Some of the assessments used in this project require the use of technology and platforms students are not familiar with. To ensure all data is accurate, students will be trained on how to use each assessment before the project begins. Traditional assessments such as homework assignments and weekly quizzes will be given throughout the project. Nonconventional assessments such as Padlet, Kahoot, and Plicker Cards will be used to collect data in a different format. During the project, whole group discussions as well as individual discussions will take place to assess students and aid in the data collection process. These three

different methods will minimize bias and allow the researcher to look at the data from multiple angles.

Reflection

While studying action research, it became obvious that having the entire research plan outlined before starting is extremely important. It allows for the researcher to make sure they are prepared if anything comes up during the collection of the research and implementation of the study. After completing the literature review, I realized how important this process is. I learned valuable information about the tools I will be using in the action research project and how to use them to be successful. The way in which I collect the data is important because, if done correctly, it will answer my action research question and hopefully help me solve my problem statement. While doing all of this, it is important that the students well-being is at the forefront of the study. A successful action research study has the ability to resolve real concerns in the field of education.

References

- American College of Education. (2022). RES5153 Research methods: Module 3.
Canvas. <https://ace.instructure.com/courses/1801147/modules/items/32239748>
- Baldeon, Johan & Puig, Anna & Rodriguez Santiago, Inmaculada & López-Sánchez, Maite & Grau, S & Escayola, Montserrat. (2015). GAMIFICATION OF ELEMENTARY MATH LEARNING: A GAME DESIGNER ROLE-PLAYING EXPERIENCE WITH KIDS. Proceedings of the 2nd International Workshop on Gamification in Education: gEducation 2015.
- Beatty, I. D., & Gerace, W. J. (2009). Technology-Enhanced Formative Assessment: A Research-Based Pedagogy for Teaching Science with Classroom Response Technology. *Journal of Science Education and Technology*, 18(2), 146-162. doi:10.1007/s10956-008-9140-4
- Chalmers, J.; Cowdell, F. What Are Quantitative and Qualitative Research Methods? A Brief Introduction. *Dermatological Nursing*, [s. l.], v. 20, n. 2, p. 45–48, 2021. Retrieved July 30, 2022, from <https://discovery.ebsco.com/linkprocessor/plink?id=b2280316-b42c-3453-aa81-3b684755582a>.
- Clements, Heppen, Rickles, Sorensen, Taylor, Walters. (2017, June). *Course Progression for Students Who Fail Algebra I in Ninth Grade*. Wwww.Air.Org. Retrieved July 14, 2022, from <https://www.air.org/sites/default/files/2022-03/Course-Progression-for-Students-Who-Fail-Algebra-I-in-Ninth-Grade-June-2017.pdf>

- Dellos, R. (2015). Kahoot! A digital game resource for learning. *International Journal of Instructional Technology and Distance Learning*, 12(4), 51-56. Retrieved July 21, 2022, from <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.694.5955&rep=rep1&type=pdf#page=53>
- Gates, S. (n.d.). *Benefits of Collaboration* | NEA. NEA. Retrieved August 4, 2022, from <https://www.nea.org/professional-excellence/student-engagement/tools-tips/benefits-collaboration>
- Gholami, V., & Moghaddam, M. (2013). The Effect of Weekly Quizzes on Students' Final Achievement Score. *I.J.Modern Education and Computer Science*, 1, 36-41. Retrieved July 21, 2022, from <https://pdfs.semanticscholar.org/e7ac/71a9d9fd8b85985665e1af5ecd46a0640c20.pdf>.
- Kehren, P., Kelly, K., & Heffernan, N. (2013). Does Immediate Feedback While Doing Homework Improve Learning? *Worcester Polytechnic Institute*. Retrieved July 21, 2022, from <https://www.aaai.org/ocs/index.php/FLAIRS/FLAIRS13/paper/view/5938/6134>.
- Kleinsmith, C. L. (2017). The effects of using Padlet on the academic performance and engagement of students in a fifth grade basic skills mathematics classroom. *Rowan University Rowan Digital Works*. Retrieved July 21, 2022, from <https://rdw.rowan.edu/cgi/viewcontent.cgi?article=3406&context=etd#:~:text=The%20results%20of%20this%20study,grade%20basic%20skills%20mathematics%20classroom>.

NWEA Connection. (2022, January 11). NWEA. Retrieved July 28, 2022, from

https://connection.nwea.org/s/article/About-the-SAT-College-Readiness-Benchmarks-linking-study?language=en_US

Popaham, James. Using Formative Assessments. (n.d.). *Teach Reading, Not Testing: Best Practice in an Age of Accountability*, 25-40. doi:10.4135/9781452275451.n3

Shorten, A. (2017, July 1). *Mixed methods research: expanding the evidence base*. Evidence-Based Nursing. Retrieved July 31, 2022, from <https://ebn.bmj.com/content/20/3/74>

Thompkins, C., Howell, N., & Mull, C. (2018). Plickers for Success: A Technological Tool for Advancement in Data Collection. *Journal of Extension*, 56(7). Retrieved July 21, 2022, from

<https://tigerprints.clemson.edu/joe/vol56/iss7/2/#:~:text=A%20technological%20tool%20called%20Plickers,build%20surveys%2C%20and%20export%20data.>

Thompson, D. (2007). Effects of evaluative feedback on math self-efficacy, grade self-efficacy, and math achievement of ninth grade algebra students: A longitudinal approach. doi:10.18297/etd/1434

U.S. Department of Health, Education, and Welfare. (1979). The National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research. *The Belmont Report*. https://www.hhs.gov/ohrp/sites/default/files/the-belmont-report-508c_FINAL.pdf

Why Mixed Methods? (n.d.). Johns Hopkins Bloomberg School of Public Health. Retrieved July 31, 2022, from <https://publichealth.jhu.edu/academics/academic-programs/training-grants/mixed-methods-research-training-program-for-the-health-sciences/about-the-program/why-mixed-methods#:~:text=Mixed%20methods%20enables%20investigators%20conceptually,o%20research%20to%20facilitate%20translation.>

Wood, T., Brown, K., & Grayson, M. (2017). Faculty and Student Perceptions of Plickers. *ASEE*. Retrieved July 21, 2022, from <http://people.cst.cmich.edu/yelam1k/asee/proceedings/2017/3/84.pdf>

Yoder, S. (2022, February 9). *Kids are failing algebra. The solution? Slow down.* The Hechinger Report. Retrieved July 30, 2022, from <https://hechingerreport.org/kids-are-failing-algebra-the-solution-slow-down/>

APPENDICES

APPENDIX A

NWEA Fall and Winter Scores

Name	Fall NWEA Score	Winter NWEA Score	Percent Change	Student Growth
			0%	
			0%	
			0%	
			0%	
			0%	
			0%	
			0%	
			0%	
			0%	
			0%	
			0%	
			0%	
			0%	
			0%	
			0%	
			0%	
Average				
Class Growth				0%
Key				
Student Growth: 1 = yes, 0 = no				

