6-11-2024

Instructional Strategies that Support Student Achievement with the Eureka Algebra 1 Curriculum

Honnalora Hill
Walden University

Walden University

College of Education and Human Sciences

This is to certify that the doctoral study by

Honnalora Hill

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Brenda Kennedy, Committee Chairperson, Education Faculty
Dr. Eilene Edejer, Committee Member, Education Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

Walden University
2024

Abstract

Instructional Strategies that Support Student Achievement with the Eureka Algebra 1 Curriculum

by

Honnalora Hill

MA, University of Phoenix, 2010

BS, Buffalo State University, 2003

Project Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Education

Walden University

August 2024

Abstract

Numerous states use research-based mathematics curricula as a teaching tool to enhance mathematics performance outcomes on state assessment scores. Despite implementation of the Eureka curriculum, students at the study site were still struggling to master Algebra 1 skills sufficiently to pass the Louisiana state exam. The aim of this basic qualitative study was to explore strategies teachers employed while implementing the Eureka curriculum to increase student achievement. The study was guided by Vygotsky's zone of proximal development (ZPD) theoretical framework and involved semi-structured interviews with 12 participants who had been teaching Algebra 1 with the Eureka curriculum for at least three years. The research question was focused on instructional strategies teachers used with Eureka to teach Algebra 1 students within their ZPD levels. Data analysis was conducted using open coding for review of themes and patterns. Identified themes included strategies to support Algebra 1 achievement, strategies that hinder student achievement, other factors influencing academic achievement, instructional strategies that were absent from the Eureka curriculum, and the necessity to enhance professional development. A professional development program was developed based on research findings to assist teachers in implementing effective strategies for the Eureka curriculum aimed at increasing students' academic performance in Algebra 1. This professional development initiative has the capacity to bring about positive social change by increasing teachers' facilitation of mathematics instruction with evidence-based strategies that increase student achievement in Algebra 1 concepts and skills.

Instructional Strategies that Support Student Achievement with the Eureka Algebra 1 Curriculum

by

Honnalora Hill

MA, University of Phoenix, 2010

BS, Buffalo State University, 2003

Project Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Education

Walden University

August 2024

Dedication

This dissertation is dedicated to the memory of my mom Sharon Dyer and my brother Jacob Hill, whose unwavering love, guidance, and support continue to inspire me every day. Though they are no longer with us, their legacy lives on in the pages of this work.

To my children, Seth Minnerup, Austin Minnerup, and Harlie Governor, whose sacrifices, encouragement, and belief in me have been the driving force behind my academic journey. This achievement is as much yours as it is mine. I love you all to the moon and back.

I dedicate this dissertation to my partner, Cedric Governor, for his understanding throughout this endeavor. I am grateful for your presence in my life.

To my sibling, Heidi Hill, and extended family, thank you for your love, encouragement, and unwavering belief in my abilities. Your support has been a constant source of strength and motivation.

I also dedicate this work to my friends and mentors who have walked alongside me on this journey, offering guidance, support, and encouragement every step of the way.

Finally, this dissertation is dedicated to all those who have paved the way for knowledge and progress, whose contributions have shaped the world we live in today. May this work honor their legacy and inspire future generations.

Acknowledgments

I would like to express my deepest gratitude to my Committee Chair, Dr. Brenda J. Kennedy, for her invaluable guidance, support, and encouragement throughout the entire process of this project study. Her expertise, patience, and unwavering commitment have been instrumental in shaping this work.

I am also thankful to my Second Committee Member, Dr. Eilene Edejer, for her insightful feedback and constructive criticism, which significantly enhanced the quality of this research.

Special thanks are due to Walden University for providing resources, facilities, and financial support, without which this study would not have been possible.

I am grateful to my family for their unconditional love, understanding, and patience during this challenging journey. Their constant encouragement has been a source of strength and motivation.

I would like to extend my appreciation to my friends and colleagues who have offered their assistance and encouragement throughout this process. Your support has meant the world to me.

Lastly, I am deeply grateful to all the participants who generously shared their time and insights for this study. Your contributions have been invaluable and have enriched the findings of this research.

Table of Contents

Section 1: The Problem....1

The Local Problem....1

Rationale....4

Definitions of Terms....5

Significance of the Study....6

Research Question....7

Review of the Literature....7

Conceptual Framework....7

Review of the Broader Problem....9

State of Mathematics Proficiency in America....10

History of Eureka....12

CCSSM....13

Instructional Design to Improve Learning....14

Instructional Strategies....17

Factors That Impact Student Achievement....18

Impact of Effective Professional Development....21

Implications....22

Summary....22

Section 2: The Methodology....24

Participants....25

Procedure for Gaining Access to Participants 26
Establishing Participant Working Relationships 26
Protecting Participants’ Rights 27
Participant Profiles 27
Data Collection 29
Justification of Data Collection 30
Data Collection Process 30
Role of the Researcher 30
Data Analysis Procedures 31
Data Check 32
Data Analysis Results 32
Instructional Strategies in Terms of Students’ ZPD Levels 32
Emergent Themes and Connection to Framework 37
Theme 1: Strategies to Support Algebra 1 Achievement 38
Theme 2: Strategies That Do Not Support Student Achievement 41
Theme 3: Noncurricular Factors Influencing Academic Achievement 43
Theme 4: Instructional Strategies That are Absent from the Eureka Curriculum 47
Theme 5: Curriculum and Resources That Were Used Before Eureka 47
Theme 6: Need to Enhance Professional Development 48
Treatment of Discrepant Cases 52
Evidence of Quality 52

Conclusion 53

Section 3: The Project 55

Description and Goals...55

Rationale 56

Review of the Literature 57

Factors that Support Student Achievement.. 58

Parental Support of Mathematics.. 58

Instructional Strategies and the Eureka Curriculum 59

Professional Development 60

Project Description...65

Potential Resources and Existing Supports... 65

Potential Barriers and Solutions.. 65

Proposal for Implementation and Timetable...66

Roles and Responsibilities 67

Project Evaluation...67

Project Implications 69

Social Change 69

Local Community 69

Conclusion 71

Section 4: Reflections and Conclusions..72

Project Strengths and Limitations...72

Recommendations for Alternative Approaches 73

Scholarship, Project Development and Evaluation, and Leadership and Change 74
Scholarship 74
Project Development 75
Leadership and Change 76
Reflection on the Importance of the Work 76
Implications, Applications, and Directions for Future Research 78
Conclusion 80
References 84
Appendix A: The Project 105
Appendix B: Invitation 128
Appendix C: Consent Form 129
Appendix D: Interview Protocol 130

List of Tables

Table 1. Algebra 1 End of Course Scores for 2014-2019..2

Table 2. Algebra 1 Retested End of Course Scores for 2014-2019.....................................3

Table 3. Participants...29

Table 4. Summary of Responses to Interview Questions 1-6...37

Table 5. Summary of Responses to Interview Questions 7-9..38

Table 6. Themes, Conceptual Framework, and Participants' Responses Regarding RQ152

Table A1. Professional Development Timeline Day 1 and 2 106

Table A2. Professional Development Timeline Day 3 107

Section 1: The Problem

The Local Problem

Since 2015, the percentage of students who scored below basic on the end of course (EOC) exam for Algebra 1 in a local school district in the southern region of the United States ranged from 41 to 44% despite the district's adoption of the Eureka curriculum as their Tier 1 curriculum in Fall 2014 (Louisiana Department of Education, 2020). Tier I curriculum meets all nonnegotiable criteria and scores highest in terms of indicators of superior quality for high school graduation requirements (Louisiana Department of Education, 2020).

The Louisiana Department of Education requires high school students who are taking Algebra 1 to master numbers and quantities, algebra, functions, and statistics and probability, which are defined by state standards. According to the Louisiana Department of Education (2020), students need to be prepared to take the EOC exam which is a requirement before they graduate from high school. Students who do not demonstrate their proficiency in terms of necessary mathematics skills that are needed in Algebra 1 must retake the test until they pass the exam with an 80% or higher (Louisiana Department of Education, 2020). This requirement has led officials at the Louisiana Department of Education to mandate that public school districts operating under the jurisdiction of school boards must choose either Springboard or Eureka as Tier 1 mathematics curriculum.

Table 1 shows percentages of students who scored below basic on the EOC exam from 2015 to 2019. Students were not assessed in 2020 due to the COVID-19 pandemic.

Over 40% of students in the local region who took Algebra 1 between August 2014 and May 2019 scored below basic on the EOC exam which measures proficiency involving functions, numbers and quantity, algebra, and statistics and probability. Hasselle stated that the average number of students who showed a Mastery level on the End-of-Course Exam (EOC) across the state went from 43% to 44%. Hasselle's (2019) major focus has been to cover the study sites' high stakes testing for economically disadvantaged students since the Common Core Standards were implemented in 2013.

Table 1

Algebra 1 EOC Scores: 2014–2019

Academic Year	# of Students	Proficiency Rates
2014-2015	3120	44% below Basic
2015-2016	3240	43% below Basic
2016-2017	3370	41% below Basic
2017-2018	3080	41% below Basic

Note. Test data retrieved from Louisiana Department of Education, 2020.

As previously stated, students who do not score at the basic level must retake the exam until they pass it to graduate from high school. Students do not have to retake the course; they retake the exam (see Table 2). Between 2015 and 2019, 19 to 22% of retesters earned below basic on retakes. I did not identify whether the same students retook the exam multiple times.

Table 2

Algebra 1 Retest EOC Scores: 2014–2019

Academic Year	# of Retakes	Retakes Rate
2014-2015	1372	21% below Basic
2015-2016	1681	19% below Basic
2016-2017	1700	21% below Basic
2017-2018	1679	22% below Basic

Note. Test data retrieved from Louisiana Department of Education, 2020.

The Algebra 1 EOC exams measure mathematics skills according to state common core standards. According to Irizarry (2021), between 2010 and 2015, 43% of students in the United States who failed Algebra 1 in the ninth grade were able to pass Algebra 1 by their fourth year of high school. However, out of that population, only 65% gained enough credits to graduate by the end of their 12th-grade year.

The National Center for Education Statistics (NCES, 2020) stated 62% of students in the United States are at or above the mathematics skills level that is needed by the time they graduate high school. According to Richards (2020), because the United States ranks 31st out of 79 countries, mathematics experts have recommended that America's mathematics curriculum in the 21st century involve more real-world mathematics strategies that include scaffolding, which should focus on financial algebra and mathematics modeling.

McLeod (2019) defined scaffolding as strategies that consist of activities that include but are not limited to modeling skills, providing hints or cues, and adapting materials that are provided by teachers or peers. According to Richards (2020), hands-on learning provides tangible items that students can manipulate to learn skills Richards explained giving students blocks and dividing blocks into groups helped them understand the concept of division. Once students were able to divide blocks into even groups, teachers would then remove blocks, and students would then draw groups for division problems. Eventually, drawings would be taken away, and students would be able to do division problems without any assistance.

Rationale

The purpose of this qualitative project study was to explore the instructional strategies teachers use while using the Eureka Algebra 1 curriculum to support student achievement in Algebra 1. Specifically, this project investigated strategies teachers use within students' ZPD levels. The Eureka curriculum was implemented 8 years ago as the state's Tier 1 curriculum to improve students' mathematics skills as well as proficiency levels on the state exam. Students must take an EOC test to prove mastery of Algebra 1 skills based on common core standards of mathematics. However, since 2016, students' performance levels and mastery of skills have not improved according to state test scores (Louisiana Department of Education, 2019).

In 2014, 51,030 students in the state took the Algebra 1 state exam. Of those students, 22,963 failed the exam (Louisiana Department of Education, 2019). Likewise, in 2019 after 4 years of using the new Eureka curriculum, 42,140 students took the exam, and of those, 22,484 students failed it (Louisiana Department of Education, 2019).

Algebra 1 mathematics skills that are needed to pass the EOC are also needed to pass the American College Testing (ACT) exam. In the state where the study took place, EOC and ACT exams, in which 30 out of 60 questions in the mathematics section test

Algebra 1 mathematics skills, are graduation requirements. The remaining 30 questions of the ACT exam relate to Algebra 2, precalculus, and geometry skills, which all stem from basic Algebra 1 skills. Receiving a low mathematics score on the ACT exam can lead to students having to take remedial classes in college, which leads to students having to pay more for college along with taking longer to graduate college (Allensworth & Clark, 2020). Many students in the inner city do not have resources to spend more on college, as they can barely afford college in the first place (Houle & Addo, 2019).

This research is important because the state mandates Eureka to be used in the classroom as a Tier 1 curriculum; however, the curriculum tells a teacher what to teach, not how to teach the material. Therefore, teachers may struggle to try to find ways to improve students' achievement levels with the curriculum that is given to them (Niemelä, 2022). The purpose of this qualitative study is to explore instructional strategies teachers use while using the Eureka Algebra 1 curriculum to support student achievement in Algebra 1 which will assist the study site as well as other schools that use the Eureka curriculum.

Definitions of Terms

This section contains definitions of key concepts used in the study.

Common Core State Standards of Mathematics (CCSSM): Set of high-quality academic standards in mathematics. These standards outline what students should know and be able to do at the end of each grade (Crossman, 2020).

Remedial coursework: Courses in reading, writing, or mathematics for college-level students who lack skills to perform work at the level required by the institution (Parsad, 2003).

Tier 1 Curriculum: Tier I curriculum meets all nonnegotiable criteria and scores highest in terms of indicators of superior quality for high school graduation requirements (Louisiana Department of Education, 2020).

Zone of Proximal Development (ZPD): The space between what learners can do without assistance and what they can do with adult guidance or in collaboration with more capable peers (Vygotsky, 1978, p. 86).

Significance of the Study

This study may be significant in that it involved exploring instructional strategies teachers use in terms of students' ZPD levels while using the Eureka Algebra 1 curriculum to support student achievement in Algebra 1. Although Algebra 1 teachers have used the required Eureka curriculum since 2014, there has been little to no improvement in terms of students' EOC test scores since 2015. During this study, I interviewed local Algebra 1 teachers who are using the Eureka Algebra 1 curriculum to explore which instructional strategies they use to connect previously mastered math skills with unlearned Algebra 1 skills. Findings of this study may lead to positive social change by providing teachers and administrators with specific instructional strategies used by teachers facilitating the Eureka Tier 1 curriculum to increase students' understanding of Algebra 1 skills and concepts. Identification of these strategies will be especially important for students in lower socioeconomic groups and ethnic minority groups who traditionally are behind their peers in terms of high-stakes mathematics skills and concepts. Findings may also lead to positive social change by increasing graduation rates, as students may pass the Algebra 1 EOC test the first time they take the course, which could impact their on-time graduation and decrease high school dropout rates.

Research Question

RQ1: What instructional strategies do teachers use with the Eureka curriculum to teach Algebra 1 students within their ZPD levels?

Review of the Literature

Conceptual Framework

The conceptual framework I chose for this study was ZPD. Vygotsky (1978), defined ZPD as "the distance between the actual developmental level which is determined by independent problem solving and the level of potential development which is determined through problem-solving under the guidance or in collaboration with an adult or more capable peers" (p. 86). Vygotsky argued children's developmental level could not be understood without fully understanding their upper boundaries. The upper boundary is determined by tasks that children can do with the assistance of adults or more capable peers. Vygotsky theorized human interactions are vital to new learning. As people collaborate, they participate in aiding, cooperating, and facilitating, which serve as the foundation for internalizing, acquiring, and applying fresh knowledge autonomously (Eun, 2019). Walsha (2017), stated mathematics development should be taught using the ZPD, as it is conceptualized as a process involving participation, communication, inclusiveness, instructiveness, collaboration, and situatedness.

According to McLeod (2019), there are four levels of the ZPD, which include Levels I and II, where experts assist student with scaffolding, and Levels III and IV, which involve internalization and recurrence when students encounter difficult tasks they may not understand. In Levels I and II, the fundamental concepts are scaffolding of instruction and verbal interactions between teachers or experts and learners (Crossman, 2020; Fani & Ghaemi, 2011; Siyepu, 2013). During Level I, teachers use different types of strategies to model learning tasks that learners should be able to perform under the guidance of teachers. However, some skills are beyond students' ZPD levels that cannot be learned even via professional guidance, and this is where teachers need to adjust teaching strategies to decrease difficulties (Legg, 2020). Once teachers have decreased difficulty levels and learning is taking place, then there is a steady decline in teacher responsibilities in terms of task performance, while the learner's portion of responsibility is increased (Legg, 2020). Once students are able to perform skills independently, Level II can begin.

During Level II, teachers should use different instructional strategies that can assist students in achieving skills that have not been fully mastered and are slightly above students' ZPD levels (Quain, 2020). Once students can complete tasks independently, Level III can then begin. During Level III, also known as the internalization and automatization level, learners integrate their knowledge of tasks and integrate them into the larger ontogenetic framework of growth (Tinungki, 2019). By the end of Level III, students have reached independence and have fixed knowledge of skills. Therefore, skills that have been mastered cannot be forgotten (Tinungki, 2019). Students no longer needs assistance from adults to accomplish skills that were once above their ZPD level. Finally, Level IV is known as the recurrence level, which is when learners can put skills into practice. During this level, students can take skills they have mastered and use it to gain prior knowledge of other skills that they may still struggle to accomplish.

According to Adler and Venkat (2020), the ZPD needs to be part of the thought process when deciding what instructional strategies will increase students' chances of mastering new skills. Understanding what instructional strategies are used to improve students' academic achievement in mathematics may help teachers better prepare instruction to meet all students in terms of their ZPD levels.

Review of the Broader Problem

Since the 1960s, attempted solutions to improve students' academic achievement in terms of mathematics skills and concepts have fallen into one of four reform categories: preschool, teacher, instructional, and standards-based (Porter et al., 2011). Ashurova et al. (2019), observed preschool reformers focused on academic achievement of students who attended preschool programs showed early gains in achievement that were not sustained. Teacher reformers focus on teacher quality and the effects it has on student achievement (Kraft, et al., 2020). Instructional reformers focus on interventions and how they could improve student achievement (Tekkumru-Kisa et al., 2020). Standards-based reforms involve standards movement and the concept of student achievement (Polikoff et al., 2020). The focus of this study was instructional reform. I explored strategies teachers used to increase mathematics achievement. I used the

Walden University Library to access ERIC, SAGE Journals, and Google Scholar. The keywords I used were: *achievement level in Algebra 1 mathematics skills, achievement level in mathematics skills, Algebra 1, common core, Eureka, factors that impact learning, factors that impact mathematics skills, family impact on students' mathematics skills, high school mathematics, impact on students based on teacher knowledge of mathematics, instructional strategies, instructional strategies in terms of ZPD levels, learning styles, math proficiency, peer influence on students' mathematics achievement, professional development, remediation in high school math, remediation in college math, scaffolding, strategies of teaching, strategies of teaching math, teacher education,* and *Vygotsky*. The review of literature includes a discussion of the state of math proficiency in America, history of Eureka, common core standards of mathematics, instructional design, instructional strategies, factors that impact student achievement, and the impact of effective professional development of teachers in order to understand effects of instructional strategies on students' mastery of Algebra 1 skills.

State of Mathematics Proficiency in America

The United States currently has a widespread issue with college-bound students who lack necessary mathematical skills to excel in college-level mathematics courses. According to Riggleman (2017), 60% of incoming freshmen in the United States are unprepared for the academic demands of college, with mathematics being the most prevalent area of deficiency. According to the NCES (2018), more than 50% of students entering college were required to enroll in a developmental or remedial math course.

Additionally, although progress has been made in all demographic areas since 2014 when looking at education in general terms, the achievement gap is still the widest in mathematics. African American and Latino students enter college requiring remedial math classes at an estimated rate of 80% to 90%, which is significantly higher than their White counterparts (Arcallana et al., 2018). Mathematics competency is critically important before students reach Algebra 1. According to Evans and Field (2020), preschool mathematics proficiency can predict future success in math courses through high school, even when controlling for factors such as socioeconomic status, IQ, and parental education levels. Arcallana et al. (2018), showed high school algebra performance could be predicted by how anxiety and is more of a predictor than mathematics proficiency throughout early educational years. Arcallana et al. (2018), stated student anxieties about mathematics will increase throughout their early years and therefore correlates with their performance and standardized test scores.

Mathematics skills are important throughout students' entire educational careers, with the potential for predicting outcomes based on math skills beginning as early as preschool. Algebra 1 has the potential to narrow and close the achievement gap and prepare students for college-level mathematics courses (Lee & Mao, 2021). Additionally, skills learned in Algebra 1 are learned in other countries in the eighth grade or around age 13, which nullifies the argument that Algebra 1 is too complicated for the adolescent brain (McMullen, 2018). Algebra 1 is of critical importance to both high school success and postsecondary readiness due to its inclusion in nearly every advanced mathematics and science course in high school. Additionally, Kelly (2008), stated Algebra 1 is the gateway to higher mathematics, college degrees, and higher earnings due to employment. Algebra 1 is not simply a skill that is needed to complete high school; it is also a factor that can predict the future socioeconomic status of students. According to Wedekind (2019), one of the factors that has an impact on students' learning of Algebra 1 skills that are needed in future mathematics is curriculum that is used in schools. Wedekind (2019), stated curriculum should provide students with skills that are needed to succeed in college, become employed, and stay employed.

History of Eureka

Since the National Council of Teachers of Mathematics (NTCM) was formed in 1980, the curriculum used for Algebra 1 courses has changed eight times (Bullock, 2019). Of those eight designed curricula, each focused on different skills and concepts in Algebra 1 that students needed to master (Bullock, 2019). Each created curriculum also used different teaching methods and strategies to get the students to master the skills and concepts. One of those eight designs was created and was called Great Minds.

Great Minds received one of the four contracts the New York State Education Department (NYSED) had funded to produce mathematics curriculum materials aligned with common core learning. These four contracts spanned from prekindergarten through Grade 12, which Race to the Top Grant funded and awarded to NYSED by the federal government (Schneider, 2019). Development of the curriculum started in spring 2012 and was completed in December 2014. An extensive review process ensured accurate interpretation of appropriate alignment of standards (Louisiana State University, 2022). The development process was undertaken primarily by teacher-writers under the advice of lead writers and mathematicians. The completed curriculum totaled more than 45,000 pages. As materials were developed, the NYSED posted the materials on their website not only for ease of access for their teachers but teachers across the United States. Materials that were developed for the state of New York became the foundation for Eureka Math, the name given to the comprehensive mathematics curriculum and professional development platform by Great Minds. Great Minds has posted the entire curriculum on its website for free download. In addition, they have continued to improve upon their original product through updates and the creation of supplemental resources and products to assist schools with implementation.

According to Schneider (2019), Eureka Math is the only mathematics curriculum that was developed from scratch to align with new common core mathematic standards that were implemented by the No Child Left Behind Act of 2010. To understand why this is important, one must first understand what the CCSS for Mathematics are.

CCSSM

Common Core State Standards of Mathematics (CCSSM) are considered key in terms of supporting efforts to close the achievement gap between European American, African American, and Hispanic American students (Savage et al., 2018). CCSS were created to ensure all students graduating from high school would have skills and knowledge to succeed in college, career, and life. CCSS were designed due to U.S. students being stagnant as well as losing ground in comparison to their international peers in the subject of math. Challenges and expectations of CCSSM seem like unattainable goals for many educators. Savage et al. (2018), found teachers who connect basic, prerequisite, and current skills during lessons do not just get students to master skills, but also ensure they are able to apply skills. Clements et al. (2019), claimed teachers reported the CCSSM led them to teach in ways that contradicted their understanding of what good educational practices were. However, even though teachers struggle with challenges and expectations of CCSSM, they must learn how to incorporate them into their instructional design.

Instructional Design to Improve Learning

Instructional design is referred to as any process that is aimed at creating instructional education to improve some aspects of student learning (Rajaram, 2020). Instructional design involves determining the goal of instruction and what learners need and developing a framework to bridge the two. Teachers play a fundamental role as mediators and guides through the learning process, as they are experts who are versed in a variety of strategies and methods (Rajaram, 2020). Teachers use instructional design when creating lessons or unit plans that are used for teaching and learning during their instructional time (Francisco & Celon, 2020). During lesson planning, teachers should look at skills that need to be achieved and evaluate their students' ZPD levels to help plan out what strategies and methods are needed for students to achieve those skills.

Agarwal and Shrivastava (2020), stated instructional design has five phases that align with the five phases of active teaching. Analysis aligns with selection of content, and designs align with organization of content. justification of principles and maxims of teaching to be used, development aligns with a selection of the appropriate methods of teaching, and evaluation (formative and summative) aligns with the decision about the preparation (teaching strategies) and usage of evaluation tools (Weber, et al., 2020). However, according to Maheshwari (n.d.), the most important phase is the selection of the appropriate methods of teaching, which includes instructional design (instructional strategies). Maheshwari (n.d.), stated that through instructional design, the teacher must use appropriate teaching strategies to scaffold new skills. Therefore, instructional design needs to combine the art of creating engaging learning experiences with the science of how the brain works.

The use of instructional strategies during instructional design is important when teaching mathematics. In mathematics, there are points where the "rules of math" change, which means how the rules of math are interpreted or used once a child enters middle school (Cooper & Lavie, 2021). One example of this would be in multiplication, where the meaning and method change once negative numbers are introduced. At these points, the new mathematics rules may come into conflict with what the learner has already mastered. Also, at these points, the learner may have little or no intrinsic motivation to accept the new rule (Maharani & Subanji, 2018). Maharani and Subanji (2018), stated that students often do not have an adequate understanding of the new rules of mathematics, or the rules may not be within the student’s ZPD level of understanding. For example, the rules of variables may be thought of as letters that are associated with the names of concrete objects based on their previous arithmetic knowledge. Therefore, understanding that the variable is just a placeholder comes in conflict with students’ initial knowledge, creating an internal conflict for them, which is known as cognitive conflict (Noto, et al., 2020). Cognitive conflict is defined by Maharani and Subanji

(2018), as the problem presented at the level of challenging the students beyond just engaging their knowledge. Ndemo and Ndemo (2018), found that a student's response to conflict varies, either by adapting to the problem or by not adapting to the problem. When students are unable to adapt to the problem, it can lead to a variety of misconceptions or a lack of understanding of a certain mathematical concept (Noto, et al., 2020). This in turn usually leads to students struggling with the more rigorous mathematics skills needed to gain higher mathematics knowledge.

Cognitive conflict can also be referred to as a child's ZPD level, as the child is unable to transfer the new rules of mathematics to the previous skills and rules that have already been learned; therefore, scaffolding is needed to reduce the cognitive conflict for the student (Oliveira, et al., 2020). This is true for Algebra, which is composed of its symbols, rules, and even signs that make up the language of algebra. Algebra is one of the most abstract strands of mathematics and is considered difficult for students to understand and master (Oliveira, et al., 2020). The symbolic language of algebra is more than just memorization of the rules; it must involve one's ability to model mathematical situations using symbols, understanding the manipulation of these symbols, and having a fundamental understanding of the concepts of variables and algebraic structures (Hawes et al., 2019). When students start to learn algebra, they inevitably try to solve problems using arithmetical thinking. That is a natural thing to do, given all the effort they have put into mastering arithmetic. Mathaba and Bayaga (2019), stated that over the past two decades, researchers have found that students learning algebra have difficulty using letters as variables, and studies focused on how students learn to represent unknowns using letters, including ignoring letters, substituting specific values for letters, treating letters as labels of objects, using letters 172 an alphabetical code, or treating each letter as having a value of 1 (Putra et al., 2019). However, instructional design cannot be effective if a teacher is unable to use instructional strategies that move students from one zone's proximal development level to another.

Instructional Strategies

Instructional strategies are techniques that teachers use to move students from one ZPD level to the next. According to Black and Allen (2018), the best strategy to use in mathematics is real-life learning. This allows the student to relate to the information that is being taught. However, Black and Allen (2018), also stated that there needs to be strong questioning, which allows the student to move through the different the ZPD levels. The questioning allows students to apply prior knowledge to new information. Finally, Black and Allen (2018), recommended the strategy of moving students across different groups to challenge students' pre-existing ways of thinking and allow students to transfer that new information to higher levels of thinking. Scaffolding strategies range from the process of implementation to reflection and questioning afterwards. Spadafora and Downs (2019), named six key strategies for effective scaffolding, which include: getting interest in the task, simplifying the task, motivating the learner, putting important skills first, minimizing frustration, and modeling. However, instructional strategies may not work if there are other factors taking place besides the students' ZPD level that affect student achievement.

Factors That Impact Student Achievement

Yu and Singh (2018) stated that student achievement is affected by numerous factors, including student ability, family socioeconomic status (SES), peer influences, and teacher quality. The first-factor, student ability, is determined to be the confidence individuals have in themselves to perform a task that they are unsure of (Yu & Singh, 2018). Many students consider mathematics a difficult subject, so they do not think deeply about receiving the material. The difficulty of a mathematics problem depends on students' beliefs in dealing with it. Students' difficulties in proving mathematics problems come from their lack of understanding of mathematics concepts and definitions, so they are unable to construct a mathematics proof, write mathematics notations, or use mathematics language correctly (Tabun, et al., 2020). Students' mathematics proving abilities are associated with their mathematics understanding abilities (Alrajeh, & Shindel, 2020). Knowing the ability of students' mathematics understanding is an indispensable thing because by knowing the ability of students', the teacher knows the difficulties faced by students. Based on that case, the teacher can design the right learning so that the subject matter can be delivered well, and student achievement can increase.

Socioeconomic disproportionality is at the core of low achievement nationally and internationally (Martin, 2019). Students of low socioeconomic status (SES) are 69% less likely to achieve mathematics proficiency when compared to their high SES peers (Neufville, 2019). Martin (2019) premised that socioeconomic disproportionality also contributed to a lack of information and communication technology (ICT) and at-home educational resources. ICT and at-home educational resources were found to be critical factors that affect the achievement of low-SES students in mathematics and all other subject areas in contrast to their high-SES peers (Martin, 2019). Students in lower SES who used ICT for math and science at home demonstrated gains in their overall achievement. Agasisti et al. (2021) found that socioeconomic disproportionality influences class size and teacher-student ratio, another critical factor in student achievement. For example, Agasisti et al. (2021) also found African American students were less likely to get the individualized attention needed to address procedural errors and were less likely to obtain feedback from their teachers promptly in classrooms with a larger number of students per teacher. Teachers were also less likely to adequately monitor student engagement during instruction (Agasisti et al., 2021).

Peer influence also impacts student achievement. Olagbaju and Nnorom (2019) stated that peer influence can play a positive role in student achievement, as most students feel at home among their peers. However, according to Olagbaju and Nnorom (2019), there is a negative side among some students as they have increased anxiety among their peers as they are afraid of being intimidated, ridiculed, or even backlash from their peers. As students move from the sixth to the seventh grade, they start to connect more with their peers and less with adults, and by high school age, students almost always follow their peer's influence over their parents (Adeyinka et al., 2022). Adeyinka et al. (2022) found that students who associate more with higher-achieving peers showed less of a decline in scores, while students who associate more with lower-achieving groups showed a greater decline.

However, teacher quality is another factor when looking at student achievement. Sharpe and Marsh (2022) found that heavy emphasis on teaching math concepts, effectively explaining math ideas, and performing computations with speed and accuracy were positively associated with 9th-grade algebra achievement, while a heavy emphasis on developing computational skills, the nature and history of math, and reasoning mathematics were negatively associated with 9th-grade algebra achievement. Carbonneau (2020) stated that it was not only teachers' understanding of Algebra 1, but also their teaching experience (the number of years teaching) that was positively associated with 9th-grade algebra achievement. Carbonneau (2020) also stated that the teacher-student interaction inside the classroom was based on the teachers' experience and could impact students in a positive way when the teachers had more experience.

Impact of Effective Professional Development

Providing teachers with quality professional development opportunities is especially critical with the implementation of more rigorous college and career readiness standards in math and the adoption of the Common Core State Standards for Mathematics (Courtney, 2018). The quality of learning is impacted by the teacher's education as well as the practices used in the classroom. The standards are multifaceted, and implementation is a complex task that requires a meaningful change in teaching and professional development practices. A deep understanding requires a considerable amount of support and professional development to assure alignment of the standards with curriculum, instructional practices, and assessments during the implementation of the CCSSM (Kamin, 2016).

According to Hatisaru (2020) contrary to common content knowledge, specialized content knowledge is mathematics knowledge and skills unique to teaching. This enables teachers to “accurately represent mathematics ideas, provide mathematics explanations for common rules and procedures and examine and understand unusual solutions to a problem” (Hatisaru, 2020). Jacob et al. (2017) conducted research on the impact of a comprehensive mathematics professional development program on enhancing teachers' mathematical knowledge for instruction, as well as their ability to prompt increased student engagement in critical thinking and reasoning. The authors chose 105 teachers at random within different schools to either "teach as usual" or receive effective professional development for three years. The researchers found that teachers who had effective professional development had more substantial mathematics knowledge, which in turn decreased teacher mistakes during teaching by 17%. On the other hand, the teachers who participated in effective professional development significantly improved the students’ outcomes by 20%.

Implications

This qualitative project study aimed to explore the instructional strategies teachers use within students’ ZPD level while using the Eureka Algebra 1 curriculum to support student achievement in Algebra 1. The findings from this study were used to develop a project aimed at helping teachers facilitate instruction within students’ ZPD levels while using the required Eureka Algebra 1 Curriculum. A teacher’s use of appropriate instructional strategies could lead to an increase in students’ proficiency in Algebra 1 skills. The project deliverable is professional development for Algebra 1 teachers, which includes strategies and resources shared by participants.

Summary

In the United States, the average student is below national standards in mathematics skills needed to be successful in college (NAEP, n.d.). As suggested in literature, most students in the United States are unprepared for college math, and curriculum that includes common core standards for mathematics, which were designed to improve students' achievement in mathematics, has not been successful. Findings in literature show teachers need professional development to be shown effective ways to teach mathematics skills to increase students' mathematics achievement levels. However, findings also show there are external factors that may impact student achievement in mathematics.

The state of math in America, history of Eureka, CCSM, instructional design, instructional strategies, impact of effective professional development, and factors that impact student achievement were explored in the literature review. The conceptual framework was Lev Vygotsky's ZPD theory. In Section 2, I describe the research design, participants of the study, process of collecting and analyzing data, emergent themes and connection to the framework, treatment of discrepant cases, and evidence of quality. In Section 3, I describe the project that was developed to address the gap as highlighted in the findings. This section includes a project description, goals, rationale, literature review, project description, evaluation plan, and implications for professional development programs focused on enhancing students' academic Algebra 1 performance.

Section 4 contains reflections and conclusions of the study, strengths and limitations of the project, recommendations for alternative approaches, scholarly contributions, reflections on significance of the work, as well as implications, applications, and future research directions.

Section 2: The Methodology

Research Design and Approach

I explored the instructional strategies teachers use within students' ZPD level while using the Eureka Algebra 1 curriculum to support student achievement. Crossman (2020) defined qualitative research as researchers using their own eyes, ears, and intelligence to collect in-depth perceptions and descriptions of targeted populations, places, and events. Qualitative research involves testing ideas or hypotheses. Additionally, it involves collecting and analyzing nonnumerical data (e.g., text, video, or audio) to understand concepts, opinions, or experiences. This form of research involves gathering in-depth insights regarding a problem and generating new ideas for research. Mohajan (2018) stated qualitative research is used to understand daily life experiences and give data proper meaning. An advantage of a qualitative approach is that it allows researchers to gain an understanding of a phenomenon from participants as they are best informed to provide relevant information on a topic (Coghlan, 2016). In this case, the teachers are best informed to provide information on which instructional strategies support student achievement in terms of Algebra 1 skills and concepts. Quantitative research involves collecting and analyzing numerical data for statistical analysis. Qualitative research involves collecting and analyzing nonnumerical data to understand concepts, opinions, and experiences. This form of research involves gathering in-depth insights regarding problems and generating new ideas for research. Interviews included information on instructional strategies Algebra 1 teachers used to support student achievement. These strategies can later be implemented in other Algebra 1 classrooms to increase students' achievement in study sites.

Since 2004, several methods and techniques have progressed to explore teacher decision-making and investigate value and meaning systems. Participant observation and interviews have served as principal sources of data in many studies on teacher decision-making.

One type of methodology that is appropriate for qualitative research is observation. According to Busetto et al. (2020), observation involves the observed in natural settings. It is an expected approach to addressing instructional strategies inside classrooms; COVID restrictions in some schools do not allow outsiders into their schools. The observation approach was not a feasible methodology for this study, as I planned to obtain Algebra 1 teachers from across the state. Another type of qualitative methodology is document study. Busetto et al. (2020) described document study as collecting documents that researchers review. This methodology requires researchers to obtain both personal and nonpersonal documentation to analyze. This was not appropriate for this study, as I could not obtain information from teachers about how instructional strategies took place or why teachers chose particular strategies.

I chose focused interviews for this study. Participants were selected because they were all involved in a particular situation or shared the common experience of teaching Algebra 1 using the Eureka curriculum. Second, as the researcher, I analyzed the situation to determine hypothetically significant elements. Third, I used preliminary situational analysis to develop an interview guide. Interviews were focused on subjective experiences of participants to ascertain their understanding. Responses provided opportunities for unanticipated responses, which in turn led to my understanding of participants' experiences.

This methodological approach was appropriate for the study, as participants shared their experiences teaching the Eureka curriculum. As someone who has taught Eureka since 2019, I developed notions about how teachers view and teach this curriculum. My notions are based, in part, upon my evaluative structures and knowledge of colleagues' individual and collective concerns. This previous exposure and information that came out of the literature review provided the foundation for some provisional hypotheses, which in turn led to the development of the interview guide.

Participants

I began recruiting once the Walden Institutional Review Board (IRB) approved this study (#04-14-23-0363622). Vasileiou et al. (2018) stated a smaller number of participants is used in qualitative research to support depth of research. Therefore, purposeful sampling is more efficient than random sampling. Therefore, for my study, I used purposeful sampling to recruit 12 teachers who taught the Eureka curriculum for at least 2 years, had a valid teaching certificate in the field of high school mathematics, taught the curriculum on a 20-week semester schedule, and had classes operating on a 90-minute block schedule. I selected these specific criteria because of recommendations the Louisiana Department of Education set for all Algebra 1 teachers.

Procedure for Gaining Access to Participants

I used purposeful sampling to recruit participants for this study using a high school mathematics teacher social media group in Louisiana. Ninety-seven high school math teachers belonged to this particular social media group. Of those teachers, 30 stated in their profiles that they taught only high school Algebra 1. I invited all 30 who taught only high school to participate in this study by posting an invitation in the social media group (see Appendix B). Once participants contacted me expressing interest in participating in the study, I directly messaged them to ensure they fit the criteria. Once I knew potential participants fit criteria, I sent them consent forms that the Walden IRB approved (see Appendix C). Once participants consented to be part of the study, I set up times and days to conduct interviews. Interview questions (see Appendix D) were based on a sample of all populations of teachers using the Eureka curriculum.

Establishing Participant Working Relationships

I have been part of this high school mathematics social media group for the past 3 years and actively participate in conversations. The social media group has mutual respect guidelines which members follow. As a researcher, I worked with participants to establish mutually acceptable participation guidelines. The group’s purpose is to help one another in terms of projects, lesson planning, standards, and behaviors to improve teaching for students. I wanted to make sure I respected each participant and gave them a space where they could speak freely and without judgment.

Protecting Participants' Rights

Participants were given full details of the study via the consent form (see Appendix C) and invitation, which allowed them time to decide if they wanted to be in the study without any pressure from me. I also explained to each participant the reason for the study and how it may impact teachers and, most notably, the students we teach. If the participants decide they no longer want to be involved in the study, they could withdraw at any time. I reminded the participants that their participation was strictly voluntary and that there would be no repercussions if they chose not to participate or complete this study.

I gave participants full details about how the data collected would be used and protected. I then collected the data through video and transcribed or typed it during the audio session. I used a Google Drive with a security password and two other security questions to access the drive. My computer, protected by Norton 360 antivirus security, was the only one to access Google Drive, and all software was updated automatically. I coded the information in Google Drive by giving each participant an alias to identify each participant. After each interview, the notes were stored in Google Drive and never printed. Now that the study is over, the stored data will be kept for five years and permanently deleted. This process will occur by deleting all records from Google Drive and then emptying the trash, permanently deleting the files instantly.

Participant Profiles

Twelve Algebra 1 teachers participated in the study. The participants' teaching experience ranged from 3 to 24 years, and 10 out of the 12 teachers believed there was a need for this study because they had questions about the overall use of instructional strategies in the Eureka Algebra 1 curriculum and whether instructional strategies fit into the students' ZPD levels. I gave each participant a coded identity based on when I interviewed them. For example, I identified the first teacher I interviewed as T1 (Teacher 1), the second as T2 (Teacher 2), and continued the pattern with the other 10 teachers, as shown in Table 3.

Table 3

Participants

Participant Identifier	Gender	Years of Teaching Algebra 1
T1	Female	9
T2	Male	6
T3	Female	10
T4	Female	12
T5	Female	3
T6	Female	6
T7	Female	4
T8	Male	18
T9	Male	3
T10	Female	22
T11	Female	24
T12	Female	5

Data Collection

Justification of Data Collection

I collected data using semi-structured, in-depth interviews, which assisted me in learning instructional strategies teachers used within students' ZPD levels while using the Eureka Algebra 1 curriculum to support student achievement in Algebra. In this way, the interview protocol embraced the constructive nature of knowledge "through the interaction of the partners in the interview conversation" (Kvale & Brinkmann, 2009, p. 11). For this study, I used Alkin and Stecher's (1981) interview format. My interview protocol consisted of open-ended questions for one-on-one interviews with the participants (see Appendix D). Interview questions provided answers to RQ1.

Data Collection Process

The data collection process involved 12 participants who were interviewed through Zoom, Google Meet, or in person. Each interview lasted at most 60 minutes, in which they answered the interview questions. The interviews took place over 14 days. I conducted the interviews in a quiet room in my home, and the participants did the same to ensure privacy.

At the start of each interview, I introduced myself and reviewed the purpose of the study. Next, I read the opening narrative in the interview protocol and asked for the participant's permission to record. Once the data was collected, I stored it in a secured folder under each participant's code name. Given that I have taught Algebra 1 myself for 18 years, I wanted to make sure that I was not putting my biased feelings or experience into what the participants spoke about; therefore, after each interview, I placed a reflection on the interview inside the folder.

Role of the Researcher

I recruited participants from a Facebook group I have belonged to for the past three years. Recruiting through the social media site allowed me to gain access to participants from the study site area, the state in which the study takes place, and from other states around the United States. I have taught Algebra 1, Algebra 2, and Precalculus across the study site area for 18 years. Therefore, this form of recruitment allowed me to interview Algebra 1 teachers with whom I have had no past or present professional relationships. However, as part of the Facebook group, I may have spoken to a potential participant through group discussions about mathematics and teaching in general. At the time of this study, I did not have any professional affiliation with any of the participants; therefore, I maintained a high level of confidentiality, discretion, and transparency through communication to build trust with the participants during the study. Even though I have six years of experience teaching the Eureka curriculum and have biases about what works and does not work, I maintained an open mind as a researcher. I was cautious about keeping my biases out of the study.

Data Analysis Procedures

I used Maxwell's (2012) multiple-step iterative process to initiate the coding procedure to analyze the data. The first step involved thoroughly examining and familiarizing myself with the complete data gathered from the interviews. The data analysis process was guided by a set of predetermined codes created from Vygotsky's ZPD framework, which included self-assistance, internalization, scaffolding, verbal interactions, direct instruction, and modeling. These predetermined codes were selected based on Vygotsky's ZPD framework, which encompasses four levels, to steer the data analysis process. This specific coding approach required assigning codes to all the data obtained from the interviews by Vygotsky's ZPD theory. Moving forward, I proceeded with open coding of the predetermined codes, which involved listening to the interviews and jotting down relevant words, phrases, or sentences that pertained to my research question. I used distinct colors to highlight responses related to self-assistance (blue), internalization (yellow), scaffolding (orange), verbal interactions (pink), direct instruction (purple), and modeling (red). Utilizing distinct colors for each section facilitated a clear visualization of the patterns in how teachers employ instructional strategies within their transcripts.

Subsequently, I transferred transcripts and documents to *Dedoose,* a digital software designed for qualitative analysis. I employed computer-assisted qualitative data analysis software to facilitate data management while remaining cautious of potential pitfalls such as hasty coding or excessive coding (Miles et al., 2014; Seidman, 2013). By utilizing *Dedoose*, I could verify my initial assessment of the interviews. Each interview data set was assigned a distinct number, such as DT1 (data set for teacher 1), enabling me to compare it with the predetermined codes established during the initial review. Subsequently, I categorized the codes based on frequently utilized words or phrases. Lastly, I composed narrative profiles summarizing the findings (Maxwell, 2012).

Data Check

"The main threat to valid interpretation is imposing one's own framework or meaning, rather than understanding the perspective of the people studied and the meanings they attach to their words and actions" (Maxwell, 1996, pp. 89-90). To ensure the validity of my data, I recorded the interviews with permission from the participants to guarantee precise transcription for analysis purposes. I used descriptions, member checking, and an external auditor to help ensure the quality of the data obtained from the in-depth interviews. I applied descriptions as a control method to communicate the study results (Creswell, 2003, 2007). Using a detailed method to create consistency in the study helped ensure the results' accuracy (Creswell, 2008). I also implemented member checking in interviews by echoing, paraphrasing, and seeking further clarification on respondent comments where these are ambiguous, allowing the interviewees to confirm or correct the interviewer's interpretation of their words. Member checking was also used for feedback to determine that data interpretation was accurate (Lincoln & Guba, 1985).

Data Analysis Results

This qualitative study investigated teachers' strategies within their students' ZPD levels when teaching the Eureka Algebra 1 curriculum. To determine teachers' strategies with the Eureka Algebra 1 curriculum, I interviewed twelve purposefully selected participants to collect data for the study. I identified four major themes and five subthemes based on the analyzed data. I organized this section by themes related to the research question.

Instructional Strategies in Terms of Students' ZPD Levels

The research question that guided this study was: What instructional strategies do teachers use with Eureka to teach Algebra 1 students within their ZPD levels? To answer this question, participants responded to nine interview protocol questions related to how they determine a student's Zone of Proximal Development, how they enrich lessons, how they scaffold lessons, how they determine if a student understands skills, the specific strategies they use, and which strategies have the most significant impact.

The first interview protocol question asked how many years each participant had been teaching the Eureka curriculum. The second question was how he/she determined students' ZPD levels. All the participants stated that they used the data from the students' 8th grade LEAP test, or in cases where a student had not taken the 8th grade LEAP test, teachers used a diagnostic pre-test, which the district mandates. However, six participants (T1,3,4,8,10, & 11) also gave the students a teacher-created pre-test that included questions on content from each grade level related to the Eureka curriculum that students should know to determine the students' ZPD levels. T10 stated that using both a pre-test and their LEAP will show what skills the student learned for the LEAP and what skills the student mastered. Additionally, T4 stated, "Sometimes I give the pre-test in their native language, and they can show mastery of skills that the LEAP score showed they had not mastered."

When asked how the participants enriched a lesson when they came across a lesson that was too easy for their students, six participants (T1,2,3,5,9 & 12) stated that they stick to the Eureka curriculum as directed by the district. T3 stated, "The district [representative] came into the classroom and told me that I need to stick to the scope and sequence of the curriculum, so from that moment on, I have." T12 stated that this is only her third-year teaching, and no one had shown her how to adjust a lesson in Eureka that the students found easy. Three participants (T4,6, 7) stated they had just moved on to the next lesson, while T8, 10, and 11 spoke about how they would include more in-depth questioning for the lesson. T11 stated, "If the lesson is too easy, I use questioning to get the students to think more in-depth about other ways of solving the problem or even how to work the problem backward. These questions let me see if the students have mastered the skill."

Interview Question 5 asked each participant how they scaffolded a lesson using the Eureka curriculum. Three participants (T8, 10, & 11) responded that they use modeling, which the Eureka curriculum suggests; four (T3,4,10, & 11) said they used prior knowledge; two (T2 & 6) used questioning techniques; and two participants (T1 & 7) spoke about pre-teaching vocabulary. Three participants (T5, 9, & 12) stated that they use feedback to decide what type of scaffolding to use. T12 stated that during the Eureka curriculum Professional Development, there was no time to teach them how to scaffold Eureka, so they needed to decide how to get the students to understand the skill.

The participants were asked how they would know if the students understood the skill being taught; all 12 participants spoke about using Eureka exit tickets and tests. T8 stated that he also used informal observations along with games. "My informal observations include a game of 21 questions where I ask the students 21 questions about the daily lesson. Each question gets harder, so I am sure the students fully understand the skill."

Visual aids/Think pair share/vocabulary and using manipulatives were strategies that eight participants (T1,2,3,4,6,10,11 & 12) used daily. These participants spoke about these strategies because they were part of the curriculum during the Eureka professional development. T2 stated, "During the professional development, we were told to stick with the strategies that Eureka has embedded into the curriculum because these strategies were proven to increase understanding." T11 shared that when she questioned the professional development presenter about these strategies for working with the population she deals with, she was told, "All students learn the same, so there should be no problem using these strategies." TAs 10 and 11 stated that when they saw those strategies did not work for all their students, they included student explanations and grouping to reach more students. Three participants (T5,7 and 9) explained using Read-Write-Draw (RWD) as their primary strategy. T7 explained that using the RWD strategy allows the student to explain not only in words but also in pictures how to solve a mathematical problem. All twelve participants agreed that the strategy they see the most success with is using manipulatives. When asked how they knew this was the most successful strategy, all twelve replied that test scores proved that the students mastered the skill taught using manipulatives.

Table 4

Summary of Responses to Interview Questions 1-6

Participant	Interview Q 1 Eureka Experience	Interview Q 2 & 3 How do you determine Level of Student	Interview Q 4 Enriching a Lesson that is too easy	Interview Q 5 How do you scaffold	Interview Q 6 How do you tell if students understand the skill
1	4 years	Pre-test or 8th grade LEAP 2025 test	Sticks strictly to Eureka	Pre teach vocabulary	Eureka exit ticket/quiz/test
2	3 years	Pre-test or 8th grade LEAP 2025 test	Sticks strictly to Eureka	Questioning	Eurek exit ticket/quiz/test
3	4 years	Pre-test or 8th grade LEAP 2025 test	Sticks strictly to Eureka	Prior Knowledge	Eureka exit ticket/quiz/test
4	5 years	Pre-test or 8th grade LEAP 2025 test	Moves on to another lesson in Eureka	Prior Knowledge	Eureka exit ticket/quiz/test
5	3 years	Pre-test or 8th grade LEAP 2025 test	Sticks strictly to Eureka	Feedback	Eureka exit ticket/quiz/test
6	3 years	Pre-test or 8th grade LEAP 2025 test	Moves on to another lesson in Eureka	Questioning	Eureka exit ticket/quiz/test
7	3 years	Pre-test or 8th grade LEAP 2025 test	Moves on to another lesson in Eureka	Pre teach Vocabulary	Eureka exit ticket/quiz/test
8	5 years	Pre-test or 8th grade LEAP 2025 test	Include more in-depth questions.	Modeling	Eureka exit ticket/quiz/test/informal observation/games
9	3 years	Pre-test or 8th grade LEAP 2025 test	Sticks strictly to Eureka	Feedback	Eureka exit ticket/quiz/test
10	5 years	Pre-test or 8th grade LEAP 2025 test	Include more in-depth questions	Modeling Prior Knowledge	Eureka exit ticket/quiz/test
11	5 years	Pre-test or 8th grade LEAP 2025 test	Include more in-depth questions	Modeling Prior Knowledge	Eureka exit ticket/quiz/test
12	3years	Pre-test or 8th grade LEAP 2025 test	Sticks strictly to Eureka	Feedback	Eureka exit ticket/quiz/test

Table 5

Summary of Responses to Interview Questions 7-9

Participant	Interview Q 7 Specific Strategies Used	Interview Q 8 & 9 Strategies have greatest impact and how do you know
1	Visual aids/Think pair share/vocabulary/ Manipulatives	Manipulatives- test scores
2	Visual aids/Think pair share/vocabulary Manipulatives	Manipulatives- test scores
3	Visual aids/Think pair share/vocabulary/Groups/ Manipulatives	Manipulatives- test scores- class work-exit ticket
4	Visual aids/Think pair share/vocabulary/ /Groups Manipulatives	Manipulatives & scaffolding test scores- class work-exit ticket
5	RDW-Read draw Write/ Manipulatives	Manipulatives- test scores
6	Visual aids/Think pair share/vocabulary/ Manipulatives	Manipulatives- test scores
7	RDW-Read Draw Write Manipulatives	Manipulatives- test scores
8	Visual aids/Think pair share/vocabulary/ /Groups Manipulatives	Manipulatives & scaffolding test scores- class work-exit ticket
9	RDW-Read draw Write/ Manipulatives	Manipulatives- test scores
10	Student Explanation/visuals/ model Visual aids/Think pair share/vocabulary/ Groups/ Manipulatives	Manipulatives, group work & scaffolding test scores- class work-exit ticket
11	Student Explanation/visuals/ model Visual aids/Think pair share/vocabulary/ Groups Manipulatives	Manipulatives, group work & scaffolding test scores- class work-exit ticket
12	Visual aids/Think pair share/vocabulary/ Manipulatives	Manipulatives- test scores

Emergent Themes and Connection to Framework

Six primary themes were identified during the analysis of the collected data in this study. The themes identified were (a) Strategies to Support Algebra 1 Achievement, (b) Strategies that do not Support Student Achievement, (b) Various Noncurricular Factors

Influencing Academic Achievement, (c) Instructional Strategies Absent from the Eureka Curriculum, (d) Resources used before Eureka curriculum, and (e) A Need to Enhance Professional Development.

Theme 1: Strategies to Support Algebra 1 Achievement

The initial data analysis revealed a central theme focused on implementing strategies to improve performance in Algebra 1. According to Adler and Venkat (2020), strategies play a vital role in the educational process by supporting a student's ZPD. However, Jiang et al. (2022) noted that many educators must pay more attention to a student's ZPD level when selecting strategies. The participants consistently utilized various strategies in their classrooms to promote student achievement. Nevertheless, participants T2,5,7,9 & 12 acknowledged that they needed to give more consideration to a student's ZPD level when deciding which strategies to use. T5 mentioned, "I have only been teaching for 3 years, so I follow the strategies provided by the Eureka curriculum for each lesson, and a student's ZPD level never crossed my mind." All 12 participants mentioned incorporating scaffolding into their daily lessons. However, only T4,8,10,11 discussed how they integrated strategies involving scaffolding, such as small group activities, peer teaching, and using manipulatives.

Vygotsky (1978) emphasized the importance of incorporating scaffolding into strategies as teachers select strategies that enhance students' ZPD levels. Adler and Venkat (2020) highlighted the critical role of strategies in helping students reach a high ZPD level. Adler and Venkat also stressed that teachers must remember to consider each student's ZPD level when selecting a strategy. Spadafora and Downs (2019) identified six essential elements of an effective strategy, which include the implementation of scaffolding, generating interest in the task, breaking tasks down into simple steps, motivating students, highlighting essential skills, and alleviating feelings of frustration. However, the strategies employed by participants T2,5,7,9 & 12 lacked breaking down the steps, alleviating feelings of frustration, and motivating students. T9 mentioned that Eureka fails to break down the skills for students, and the strategies provided by Eureka also do not address this issue. Conversely, T2 mentioned that the strategies recommended by Eureka result in increased frustration instead of alleviating it among the students, resulting in a lack of motivation. According to Rajaram (2020), teachers possess expertise in various methods and strategies, serving as mediators and guides throughout the learning process.

Among the various strategies discussed by the participants, the consistent use of manipulatives emerged as the most prominent approach. Using mathematical manipulatives, students can use objects to represent abstract concepts and physically interact with mathematical problems. Although this strategy may seem more suitable for elementary mathematics, it enables students at any level to establish connections and grasp the underlying structure of mathematical concepts, ultimately fostering a more profound understanding (Cardino & Ortega-Dela Cruz, 2020). The participants emphasized the importance of allowing students to physically manipulate objects while practicing new concepts, as it facilitates their comprehension. They expressed sentiments such as, "Even though this is high school math, students need something tactile to help them visually see the representation," and "I have my students use manipulatives whenever possible because I believe it enhances their conceptual understanding."

The collected data also revealed that the participants utilized the information obtained from various sources, such as diagnostic tests, benchmark tests, and daily classwork, to facilitate adjustments in their teaching methods, particularly in math intervention. According to van de Pol et al. (2018), using data collected by teachers to create level-based small groups will provide a form of scaffolding. Previous research on small-group work has shown that the quality of interactions significantly shapes students' learning (van de Pol et al., 2018). A few participants mentioned employing small group instruction to offer extra assistance to students. These small groups were structured in a way that allowed the teacher to provide personalized instruction to each student. The participants emphasized the significance reteaching a concept that students found challenging, but in a different manner than the initial presentation, while ensuring that the data was utilized to identify the specific skills that required attention for each student.

The participants strongly emphasized utilizing data to inform teachers of their students' academic progress. Additionally, they discussed implementing math interventions to support students who have not yet mastered specific skills. The most successful interventions were in small group sessions and peer tutoring. The participants stressed the importance of addressing unmastered math skills so students could progress academically. According to Yetman (2020), peer tutoring is beneficial because it helps motivate a learner, minimizes frustrations, allows the learner to learn quickly, provides a personalized teaching experience, and allows for efficient learning. T11 suggested that struggling students should be given more processing time to build confidence in their abilities. T6 emphasized the need for differentiated teaching methods in small group sessions, as each student learns differently. This requires extra planning and effort on the part of the teacher. Most participants shared their experiences on how they enhanced the learning process by breaking down mathematical concepts into manageable steps. This involved encouraging student discussions using questions, providing demonstrations, and incorporating hands-on activities to make the concepts more tangible. As a result, their students' comprehension of the subject matter improved significantly. T8 expressed their commitment to addressing gaps in knowledge by sourcing appropriate resources or developing their materials, even if it meant deviating from the prescribed Eureka curriculum. Additionally, teachers also employed a strategy of reviewing previously taught information. However, due to the impact of the COVID-19 pandemic, many educators found it challenging to implement this approach effectively due to the significant learning loss experienced by students.

Theme 2: Strategies That Do Not Support Student Achievement

The participants identified drill-and-kill practice as one of the strategies that does not contribute to improving academic achievement. According to T11, drill and kill hindered the students from transferring the acquired skill to another mathematical concept. Drill-and-kill has also been criticized for focusing on memorizing facts rather than developing skills. According to Butler (2019) drill-and- kill practice, the routes to automaticity, are called “mechanistic” and seen as detrimental to understanding. Participants also expressed concerns about the belief held by some administrators that drilling mathematical skills alone would lead to successful memorization. Drill-and-kill test preparation is increasingly widespread, especially in urban and rural schools where many students live poverty and where these students too often score poorly on tests (Deppa, 2022). However, they emphasized that Algebra 1 requires more complex skills than elementary math, and simply drilling and memorizing elementary math skills may not adequately prepare students for abstract mathematical thinking in higher-level courses such as Algebra 1, 2, and Precalculus.

Another approach that was deemed ineffective by participants (T4,6, 8,10, &11) was the immediate introduction of abstract-type problems, such as those provided by the Eureka Curriculum. T11 observed that this approach often led to student frustration and giving up. T6 emphasized assessing student needs before introducing abstract problems at the Algebra 1 skill level. Engaging in such problems with proper assessment can prove to be effective. T4 highlighted that some teachers may attempt to simplify or make the material more challenging to motivate students to master the skill. However, T4 argued that making the material relevant is more important holds than the specific teaching strategy. T8 stressed the significance of teaching students how to construct algorithms, prove them, and comprehend their meaning rather than simply memorizing and drilling. While teaching fluency through drill and practice is straightforward for surface knowledge like addition and subtraction, teaching students to discuss number sense and manipulating numbers becomes more challenging.

The participants also discussed another unsuccessful approach incorporated by the Eureka Curriculum: assigning students additional practice problems to work on independently. They considered this method to be ineffective, as students who already struggled with a particular concept and needed more understanding would only become more frustrated by practicing the same skill independently. Mathematics teachers must reach a consensus, and the administration and district should allow all teachers to utilize the most effective strategies for students rather than employing ineffective instructional methods that hinder students' academic achievement.

Based on Vygotsky's theory, selecting an appropriate scaffolding strategy that aligns with a student's ZPD can effectively enhance their skill mastery. The interviews with participants revealed that implementing various strategies resulted in academic achievement, as students could learn at their own level while receiving guidance from teachers or peers to enhance their ZPD level.

Theme 3: Noncurricular Factors Influencing Academic Achievement

A second theme arose from the data analysis, focusing on the external factors that impact students' academic achievement beyond the curriculum. Vygotsky's theory emphasizes the significance of human interactions in a child's acquisition of new knowledge. The study participants discussed various other factors that can influence students' success, decreased human interaction due to technology. Some participants mentioned that despite implementing different teaching strategies for Algebra 1, students encountered additional obstacles that hindered their mathematical proficiency. Eun (2019) argued that technology has led to a decline in human interaction among children today while providing immediate answers. The respondents' comments align with Eun's argument that, due to the abundance of technology accessible to students, they no longer need to memorize information. In the present era, students seek instant gratification, which results in self-imposed pressure. The respondents observed that mathematics necessitates practice, yet modern students are reluctant to engage in any form of practice. Students believe that they should be able to grasp new concepts effortlessly on their initial attempt. Therefore, it is crucial for us, as educators, to ensure that the lesson is structured in a manner that allows students to actively participate in ample practice.

The concerns raised by the participants align with the findings of Yu and Singh (2018), who identified various factors that influence student achievement, including their abilities, family socioeconomic status, peer influences, and teacher quality. The issue of socioeconomic disparity significantly contributes to low academic achievement, both nationally and internationally, as Martin (2019) emphasized. Neufville (2019) discovered that students from low socioeconomic backgrounds are 69% less likely to achieve mathematics proficiency than their high socioeconomic status counterparts. As mentioned by the participants, these external factors significantly impact students' academic success.

Furthermore, participants expressed concerns that their home environment impacts their students’ sense of safety and belonging. Reports indicate that stress is a significant factor in students feeling unsafe while traveling to school, primarily due to incidents occurring in their neighborhoods. Consequently, this affects their willingness to walk to the bus stop or school. Another teacher highlighted that students often carry traumatic experiences with them, such as the fear of deportation, a parent's incarceration, or instances of physical or sexual abuse. Therefore, some students’ focus in class shifts from learning to ensuring their safety and that of their family members. T3 emphasized the importance of establishing a secure and inclusive environment for students to facilitate personal growth.

Most of the participants emphasized the importance of parental support in helping students with their homework as another external factor. T12 specifically mentioned that parents expressed their inability to assist their children due to the disparities between Common Core math and traditional methods. T10 discussed the implementation of new terminology and problem-solving approaches with CCSS. If students and parents need help understanding the new mathematical methods, they may teach the old-fashioned approach, which could confuse the students.

The participants also identified various factors within the school environment that could impact students, such as the quality of education. One teacher noted that many students are now taking Algebra 1 online without a teacher, which could compromise the quality of instruction. Another teacher mentioned that some schools in the area are resorting to teaching middle school math on Zoom with a teacher from another state due to a shortage of qualified math teachers. T3 emphasized the importance of teacher and curriculum quality, and uniformity in academic experience in contributing to students' mathematical achievement. Finally, T4 observed that while teachers may come prepared to teach, they may need a complete understanding of the curriculum or be placed in a subject they need to be certified in, leading to frustration and a lack of understanding among students.

Theme 4: Instructional Strategies That are Absent from the Eureka Curriculum

According to the data analysis, participants' concerns about missing instruction strategies in Eureka produced Theme 4. Participants with more than seven years of teaching experience (T1,3,4,8,10 & 11) remembered the instructional tools used before Eureka and during its initial implementation. T1,3,4,8,10, & 11 mentioned that one of the instructional strategies was the absence of peer instruction in the Eureka curriculum. T11 explained that peer instruction allowed students to discuss answers and steps to solving mathematical equations with their peers, which could benefit struggling students. T3 added that peer instruction supported students by giving them time to grapple with the concept, leading to a deeper understanding. T1 observed that some students struggled with certain concepts in Algebra 1 because they were too abstract, and the Eureka curriculum did not build on their conceptual knowledge before jumping into the abstract.

T1 also spoke about how, in previous years, before Eureka, the mandated curriculum had extra resources that allowed the teachers to incorporate different learning strategies. T6 shared, "I ponder if it would work better if we started in kindergarten because there is a lot of spiraling in math and repeated practice, which is something that Eureka does not give the students."

Theme 5: Curriculum and Resources That Were Used Before Eureka

During the interview, T8 mentioned that teachers used to design their curriculum based on state standards before the introduction of Eureka. One participant shared that planning was crucial and that they would use common core standards to plan backward. Other individuals utilized a variety of tools including Everyday Math, KHAN Academy, BrainPop, Desmos, and Woot Math, in addition to materials from the previous curriculum. T1 indicated that they previously had the ability to utilize data and various resources to cater to student requirements but are currently limited to solely using Eureka.T4 expressed dissatisfaction with the initial implementation of Eureka in grades 6–8, highlighting the lack of background knowledge among students transitioning from the previous curriculum. T3 reflected on the challenges faced by teachers in bridging the gap between concrete and abstract concepts, causing frustration for both teachers and students. The participants expressed their desire for a comprehensive plan to address these gaps across grade levels when adopting a district-wide curriculum, ensuring that all students can succeed in mathematics without falling behind.

Many of the participants expressed their discontent with the lack of strategies provided alongside the Eureka curriculum. They argued that they were not adequately trained on how to implement the new curriculum using the strategies that the district required them to use with the Eureka curriculum. Furthermore, some participants felt that the training sessions did not equip them with the essential resources to adapt the curriculum beyond the scripted lessons. On the other hand, the participants noted that when the CCSS was introduced, teachers received a comprehensive overview of the standards, which enabled them to delve deeper into the standards and effectively analyze each standard for student comprehension. T10 mentioned that she and other Algebra 1 teachers used to collaborate to discuss strategies that aligned with the Common Core.

Maharani and Subanji (2018) found that students often struggle to grasp the latest mathematical regulations or find them too advanced for their current level of understanding in their ZPD. As a result, when using the Eureka curriculum, educators felt compelled to find methods that not only align with the student’s ZPD but also elevate it. This task presents a difficulty for teachers, especially when they have a limited selection of strategies available from the curriculum.

Theme 6: Need to Enhance Professional Development

Analysis of the interview data led to the emergence of Theme 6, which highlighted the dissatisfaction expressed by many participants regarding the professional development they received while implementing the Eureka curriculum. Hatisaru's (2020) research emphasizes the distinction between specialized knowledge in mathematics and general knowledge, as it equips teachers with the ability to effectively communicate mathematical concepts, provide explanations for common procedures and rules, and analyze unconventional problem-solving methods. Additionally, Jacob et al. (2017) conducted a study on the impact of a comprehensive professional development program in mathematics, aiming to enhance teachers' mathematical knowledge for teaching and foster higher levels of student thinking and reasoning.

The study revealed that all participants had taken part in a summer Eureka curriculum professional development program, but only two out of the 12 participants found it helpful. The remaining 10 expressed dissatisfaction with the professional development provided for Eureka, stating that it did not adequately prepare them to implement the curriculum. The professional development sessions were mandatory and took place over one week in either June or July, from Monday to Friday, starting at 8:00 a.m. and ending at 3:00 p.m. During the training, some participants were taught only a few strategies on how to incorporate the curriculum into the classroom, while others were shown the various components of the curriculum but were not provided with guidance on how to modify it or offer suggestions and resources for struggling students. When one participant expressed the need for more support, the district suggested contacting a math professional affiliated with Eureka. Some participants expressed the desire for additional support beyond the summer professional development, as they believed that teachers, math coaches, and master teachers were left to struggle and figure out on their own how to implement the curriculum with their students. However, two participants found the professional development sessions to be informative, but they attended the July session instead of the June session with the other 10 participants and had a different presenter. The presenter provided detailed information and additional resources that could be helpful for the Eureka Algebra 1 curriculum but informed one participant that the resources provided were based on personal experience and not officially recommended by Eureka.

The participants argued that they were not adequately trained in how to implement the new curriculum adopted by the district. Furthermore, some participants felt that the professional development sessions did not equip them with the necessary tools to adapt the curriculum beyond the scripted lessons. In contrast, the participants observed that when the CCSS was introduced, teachers received a comprehensive overview of the standards, enabling them to delve deeper into them and effectively break them down for student comprehension. T10 mentioned that she and other Algebra 1 teachers collaborated to discuss strategies aligned with the Common Core.

Table 6 presents a visual representation of the themes related to the conceptual framework based on Vygotsky's ZPD for Research Question 1. Additionally, Table 5 includes a concise response from each participant regarding these themes. The responses provided by the participants in Table 5 serve as evidence for the conclusions and interpretations made in the study, specifically exploring the instructional strategies employed by teachers within students' ZPD level while utilizing the Eureka Algebra 1 curriculum to enhance student achievement in Algebra 1. Furthermore, the subsequent section provides comprehensive direct quotes from the participants, offering in-depth explanations and analysis to support each theme for Research Question 1.

Table 6

Themes and Participants' Responses

Theme	Framework	Participants' Responses
Theme 1: Strategies to Support Algebra 1 Achievement	Using strategies such as scaffolding to increase a student's ZPD level	-Students need hands on materials to help them visually see the image. -students use manipulatives. -Having different ways of teaching a skill is vital as each student learns differently.
Theme 2: Strategies That Do Not Support Student Achievement	A strategy to increase ZPD must include implementation of scaffolding,	-Students memorize math facts instead of master the skill -Certain strategies are about the present not the future - Increasing or decreasing the level of the skill does not motivate students
Theme 3: Other Factors Affecting Academic Achievement	Human interaction and students ZPD levels are connected	-Parents complained that they were unable to help their child due to the variations in common core math contrasted with old-style methods. -CCSS has new terminology along with new ways of solving a problem -students and parents do not understand the new methods in mathematics -Language Barrier
Theme 4: Instructional Strategies Missing from the Eureka Curriculum	Connection to Instructional Strategies within a Student ZPD level	-lot of spiraling and a lot of practice this is something that *Eureka* does not give the students - teachers were trying to fill in the gaps from moving from concrete to the abstract - jumping straight into abstract was not only frustrating to teachers but caused many of the students' unnecessary frustration
Theme 5: Curriculum and Resources Used Before Eureka	Connection to curriculum that fits with in the student's ZPD.	- Eureka is above some of the students understanding - We are unable to modify the curriculum to fit the child's needs
Theme 6: A Need to Enhance Professional Development	Connection to the need for comprehensive professional development to help increase student achievement within students ZPD	-more backing with the execution of the new curriculum beyond the summer PD -Summer PD left teachers and math coaches and master teachers struggling to figure out on their own how to implement the curriculum with the students

Treatment of Discrepant Cases

Two discrepant cases emerged during my analysis of the findings, which required closer examination to gain a clearer perspective. T3 and T7 expressed that the professional development they received for the Eureka Algebra 1 curriculum during the summer was helpful in equipping them to teach the new curriculum. However, the remaining 10 participants shared that the professional development they received did not adequately prepare them for teaching the Eureka Algebra 1 curriculum. Upon further investigation with T3 and T7, who expressed their satisfaction with the Eureka professional development, it was discovered that they had attended the second session of the program, unlike the other 10 participants who had attended the initial session. Upon further inquiry, both T3 and T7 revealed that the presenter for their session was different from the one who conducted the professional development for the other 10 participants. The presenter's discussion on incorporating Eureka in her own classroom was beneficial to both. However, the other 10 participants had a different experience as their mentor had never been a classroom teacher and had not taught the Eureka curriculum.

Evidence of Quality

The ethical protocols and procedures implemented by Walden's IRB played a crucial role in supporting the accuracy, credibility, and findings of this data. In addition to these measures, the researcher diligently followed and upheld the ethical protocol measures associated with Walden's IRB throughout the study. To further ensure accuracy, a member check was conducted, allowing participants to review the transcripts and clarify or confirm their responses. This member check also served to validate the valuable contributions made by the participants during the interview protocols.

Conclusion

In Section 2, the approach, design, selection of participants, process of collecting data, and procedures for analyzing data were presented. Moreover, I addressed outcomes from interviews involving effective strategies that are employed by teachers to support students in their academic progress in Algebra 1, as well as strategies that are deemed ineffective. Individuals involved in this research fully embraced abstract reasoning to completely grasp CCSS. However, 10 of 12 participants expressed dissatisfaction with professional development, as they believed it was insufficient in terms of adequately preparing them to teach the curriculum, address skill gaps, and enhance students' academic achievements. Furthermore, participants acknowledged there were external factors beyond their control that influenced students’ achievements and their ability to master mathematical skills that are required in Algebra. In Section 3, I describe the project that was developed to address the gap as highlighted in the findings. This section includes a project description, goals, rationale, literature review, project description, evaluation plan, and implications for professional development programs focused on enhancing students’ academic Algebra 1 performance. Section 4 contains reflections and conclusions of the study, strengths and limitations of the project, recommendations for alternative approaches, scholarly contributions, reflections on significance of the work, as well as implications, applications, and future research directions.

Section 3: The Project

The analysis of the study findings led to the development of a project called *Instructional Strategies that Support Student Achievement with the Eureka Algebra 1 Curriculum*. This project is a series of professional development sessions that concentrate on techniques to improve academic performance in Algebra 1. Research findings that were presented in Section 2 indicated teachers require additional assistance in terms of implementing strategies for the Eureka Algebra 1 curriculum and accessing supplementary instructional resources to enhance their students' academic achievement. Specifically, teachers expressed the need for professional development that goes deep into teaching the Eureka Algebra 1 curriculum at a level that aligns with students' ZPD, as well as guidance on identifying skills to help struggling students bridge achievement gaps. Additionally, teachers expressed a desire for professional development to include dedicated time for planning effective mathematics lessons. Based on participants' feedback, a 3-day professional development series was created to address these concerns by providing strategies for teaching in terms of students' ZPD levels and better equipping teachers to handle external factors that contribute to lack of success. Ávalos (2011) emphasized the core of professional development is teachers' growth as learners and ability to adapt instructional practices to support student academic progress.

Description and Goals

The study's 12 participants expressed their desire to acquire skills that were necessary to address external factors that may affect student achievement. By assisting teachers in terms of identifying these external factors, it is possible to narrow the achievement gap. The 3-day training is designed to build strong skills to improve Algebra 1 success among students. The project involved providing specific classroom strategies and instructional resources to teachers to increase the achievement of their students in Algebra 1. I aimed to equip teachers with specific classroom strategies and instructional resources that will enhance their students' achievement in Algebra 1. These strategies encompass a range of teaching approaches that teachers can select from. Furthermore, professional development also involves extending knowledge beyond the classroom, potentially influencing students' learning unconsciously. Organization of professional development sessions was carefully planned to facilitate face-to-face interactions, enabling participants to engage in meaningful discussions and exchange best practices. These sessions have three primary objectives, which encompass key goals.

Goal 1 is to demonstrate the process of creating lesson plans that incorporate specific strategies for math lessons, taking into consideration content, students' ZPD levels, and the learning environment. Goal 2 is to illustrate components of the Eureka Algebra 1 curriculum and explain how additional materials can be integrated into daily math lesson plans to support students' ZPD levels. Goal 3 is to identify external factors that negatively influence students' learning processes and develop effective strategies to minimize their impact.

Rationale

This professional development aims to assist teachers in creating effective math lessons for struggling students while also addressing external factors that may hinder student growth. Previously, teachers attempted to piece together different curriculum components and relied on resources that were not necessarily research based. Participants expressed the need to rely on their own teaching designs due to deficiencies in the Eureka curriculum as well as students' incomplete understanding, as evidenced by EOC exams. Professional development can equip Algebra 1 teachers with a toolkit of research-based strategies that meet their students' educational needs. Through this training, teachers will gain tools to enhance their Algebra 1 instruction while also addressing external factors shared by participants, which can contribute to low achievement.

Review of the Literature

The literature review consists of three parts. I first address the theme of parental support in interviews, which is an external factor influencing student achievement in mathematics. I then discuss instructional strategies offered by the Eureka curriculum and emphasize the significance of using the right strategies during lessons. Lastly, I highlight benefits of professional development for Algebra 1 teachers in terms of improving their mathematics teaching techniques. Examining literature on these factors was crucial as participants identified them as potential factors contributing to low student achievement. The literature review was conducted by using the Walden University Library, Academic Search Complete, ERIC, Education Research Complete, ProQuest, and SAGE Journals. Search terms were *educational resources, effective math instruction, external factors in* *learning*, *math professional development*, *math teacher training*, *parental support*, *professional development*, and *teacher training*.

Factors that Support Student Achievement

The project's professional development series was named Effective Instructional Strategies to Enhance Academic Success in Algebra 1. The chosen session topics involved findings that were derived from collected data. Three primary factors were identified which can assist teachers in terms of honing necessary skills to foster their students' academic achievement in Algebra 1. These factors were parental support of mathematics, instructional strategies, and professional development.

Parental Support of Mathematics

Lack of parental support in mathematics, particularly in terms of homework assistance, was identified as an external theme. Barton et al. (2021) concluded parental involvement has a positive impact on children's academic achievement, leading to improved grades and standardized test scores. However, findings varied depending on level of parental involvement, which was influenced by factors such as parents' educational background and socioeconomic status. Tan et al. (2020) found parents with higher socioeconomic status tended to be more engaged in their children's education, whereas parents with lower economic status or immigrant parents often had lower levels of education and were less likely to be involved in their children's education, especially at the high school level. Despite beliefs held by many lower-income and immigrant parents that assigning homework can enhance their children's academic performance, this approach can have a negative impact (Silinskas & Kikas, 2019). Silinskas and Kikas

(2019) emphasized that type of parental involvement can effectively assist children when they encounter difficulties with particular concepts. However, when parents themselves do not understand skills or concepts their children are working on, this becomes a challenge. Yildirim (2019) suggested if teachers can provide parents with resources that can be used at home, more parents would be willing and able to participate in their children's mathematics homework.

Instructional Strategies and the Eureka Curriculum

Curriculum resources are crucial in enhancing academic performance and are specifically developed to facilitate instructional modifications within the mathematics classroom (Rezat et al., 2021). According to Pepin and Gueudet (2018), curriculum resources encompass textbooks and digital materials tailored to assist teachers and students learning, employing diverse pedagogical strategies that align with grade- or age-specific competencies.

When considering educational resources, teachers must prioritize two essential qualities: proven efficiency and trusted quality (Tang, 2020). The COVID-19 pandemic has brought the issue of educational resources to the forefront, prompting many teachers to incorporate more technology into their classes to increase student engagement (Clark-Wilson et al., 2020). However, this can also lead to students relying on applications like PhotoMath, FastMath, Mathway, or SnapCalc. To ensure that digital resources are adequate, teachers must look for resources that can be used across grade levels and differentiate skills while following teaching standards (Pepin, 2020). It is important to remember that paper and pencil are still valuable tools in mathematics, allowing teachers to monitor students' steps to solve a problem, not just the answer (Tang, 2020). Pepin (2020) emphasized that educational resources should focus on improving mastery of a skill, not just temporary knowledge.

Professional Development

According to Sancar et al. (2021), teachers must prioritize their professional development to improve student outcomes. Sims and Fletcher-Wood (2020) further highlighted that professional development is most effective when it is sustained, collaborative, subject-specific, draws on external expertise, involves teacher participation, and is practice-based. The introduction of the US Every Student Succeeds Act (ESSA) has placed professional development at the forefront, making collaborative, sustained, and practice-based professional development a requirement for receiving federal funding (National Center for Education Statistics, 2019). On average, teachers dedicate ten days per year to professional development (Sims & Fletcher-Wood, 2020). However, it is essential to note that out of these ten days, only three are subject-specific and typically occur during the summer or on a strictly voluntary basis.

The data showed that Algebra 1 math teachers have expressed the need for additional professional development focusing on effective strategies for low-achieving students in mathematics. Osman and Warner (2020) discovered that practical design and implementation are crucial for effective professional development. Furthermore, effective professional development in mathematics is likely to enhance student achievement and improve teacher practice and content knowledge (Osman & Warner, 2020). It is also essential to consider teachers' prior knowledge and diverse experiences when designing professional development programs rather than solely focusing on mathematical aspects (Greenleaf et al., 2018). Darling-Hammond et al. (2017) proposed that professional development should have a strong foundation in a core curriculum taught in practice, considering students' development, learning, social and cultural context, curriculum, assessment, and subject matter pedagogy.

According to Darling-Hammond et al. (2020), curriculum developers, educators, and other stakeholders in the United States are actively engaged in various programs to promote the development of new and enhanced activities, content, resources, and teaching and learning practices for classroom use. Bas and Sentürk (2019) and Jacob et al. (2017) conducted research and discovered that Mathematics Professional Development (MPD) opportunities play a crucial role in supporting the implementation and achievement protocols for classroom participants.

According to Polly (2018), using MPD offers practical resources and materials to address issues related to implementing and attaining educational goals. The data from national tests revealed a consistent challenge in meeting and surpassing standards and competencies, as indicated in the Nation Report Card Mathematics Assessment Content. (2020). Despite continuous efforts and the introduction of professional development programs, the test results demonstrated a discrepancy in mathematics achievement across the United States (Nation Report Card Mathematics Assessment Content, 2020). Particularly in the field of mathematics, the levels of achievement remained problematic (Nation Report Card Mathematics Assessment Content, 2020).

Horan and Carr (2018) discovered that a well-structured approach to mathematics instruction necessitates a combination of knowledge, appropriate instructional training, and professional development. Horan and Carr (2018) conducted a study that revealed a significant variation in the levels of professional development among mathematics teachers. The levels of professional development were determined based on the teachers' ability to (a) enhance their content knowledge, (b) actively participate in observations, (c) engage in reflective practices, (d) effectively implement changes, and (e) share their expertise. Previous research by Horan and Carr (2018) and Koedel and Li (2017) showed that teachers' professional development levels are influenced by their expertise and years of experience. Multiple reputable studies have suggested that professional development training for teachers should be conducted periodically. These studies have also highlighted the importance of mathematics professional development in enhancing teachers' knowledge and skills in mathematics. Specifically, Jacob et al. (2017) emphasized that mathematics professional development aims to ensure the presence of highly competent mathematics educators and positive student outcomes. The study achieved four main objectives: (a) enhancing mathematics teachers' knowledge of mathematics; (b) improving their understanding of how children learn mathematics; (c) developing effective instructional strategies for mathematics classrooms based on formative assessments to evaluate student mastery and intervention needs; and (d) equipping mathematics teachers with the skills to utilize formative assessments for assessing student mastery.

Kutaka et al. (2017) found that studying professional development among mathematics authors has highlighted the significance of comprehending teachers' attitudes and proficiency levels when teaching and learning mathematics. Through systematic reflective practices, Kutaka et al. (2017) evaluated the impact of teacher reflection on mathematics instruction. They noted that other authors suggested a consistent connection system to enhance teacher knowledge and proficiency levels and improve reflection among teachers. This concurrence eventually led to successful instructional practices and student outcomes in most American schools. The study explored professional development in mathematics to address the main idea for teachers regarding standards and skills. By providing teachers with strategies and professional development training related to standards and skills, they can implement new and improved content and strategies (Jayanthi et al., 2017).

Despite the research highlighting the significance of equipping mathematics teachers with the skills to promote student-based reasoning and thinking, determining the most effective method for delivering professional development remained challenging. The study aimed to investigate the impact of virtual or in-person professional development sessions, synchronous or asynchronous, on the development of student-based reasoning. This approach to professional development practices and designs has been deemed appropriate by experts in the field (Cosby et al., 2017; Kul, 2018; McGee et al., 2013; Schwarts, 2020). The research identified correlations between mathematics professional development, student outcomes, and teachers' informed practices through experiences. Various researchers have emphasized the importance of acquiring knowledge on incorporating mathematics into instruction and implementation strategies in American classrooms (Cosby et al., 2017; Ring et al., 2017). Ensuring that the quality of training and outcomes align with professional development goals and objectives is crucial. Therefore, researchers have recommended incorporating shared practices that address and enhance concepts that develop within the instructional setting (Karsenty, 2021). The significance of MPD is undeniable; however, there is ongoing debate regarding the most effective methods and structures to achieve optimal results. Research suggests that alternative coaching and direct student support in person have proven more advantageous for teaching and student engagement (Koichu et al., 2020). By analyzing the implementation and outcomes of MPD in the mathematics curriculum, the existing literature has made valuable contributions to this matter (Myers et al., 2020). This project has provided an opportunity to gather additional insights from teachers' experiences, aiming to enhance mathematics teacher learning programs and better cater to the needs of educators.

Lefstein et al. (2020) argued that pedagogical productive talk is the most effective form of professional development. The pedagogical productive talk involves teachers discussing their classroom experiences, concerns, and insights about students, learning, content, teaching, and practice-related issues. A crucial element of pedagogically productive talk is the exploration of problems of practice. This approach allows teachers to reflect on ineffective and effective strategies impacting academic achievement. Horn et al. (2017) further supported this idea by highlighting the Vygotskyan notion that higher-order thinking emerges through interpersonal dialogue. Teachers can employ pedagogical reasoning to investigate problems with their colleagues collaboratively during professional development. Through these methods, teachers can evaluate the evidence, analyze the arguments, and consider the costs and benefits of addressing the identified problems using specific strategies. Ultimately, this process enables them to make informed decisions on effectively solving these problems.

Project Description

Potential Resources and Existing Supports

The success of this professional development hinges on the collaboration between the facilitator and the leadership team. The leadership team and facilitator must coordinate and determine the schedule, venue, and necessary resources for the development. The existing supports encompass the venue, chart paper, writing tools, a printer for session materials, markers, reflection journals, and seating arrangements to enhance participation. Participants must bring their math standards, Eureka Algebra 1 curriculum, student information sheets or rosters, and school-issued laptops, in hard or digital format.

Potential Barriers and Solutions

Teacher collaboration may pose a potential obstacle, as some teachers may have already undergone a Eureka professional development that they deemed unproductive. Terhart (2013) highlighted the challenge of gauging the effectiveness of educational enhancements due to teacher reluctance. Teachers may resist and be less engaged as they perceive it as another professional development that will not aid them in improving their students' mathematical proficiency. Participants must recognize that this professional development is led by someone other than Eureka presenters but by a colleague who is also required to utilize Eureka as well.

One obstacle that may arise is finding enough time to teach the material and facilitate meaningful discussions among participants. The ability of teachers to develop fresh insights is contingent upon their willingness to collaborate and exchange ideas with others (Littleton & Mercer, 2013). However, lively debates and conversations can occasionally veer off course, so to maintain focus, it may be helpful to appoint a timekeeper, establish ground rules, create a parking lot for off-topic ideas, and encourage using reflection journals.

Proposal for Implementation and Timetable

The professional development program will consist of a three-day series provided during the professional days when teachers return, enabling teachers to immediately apply the valuable information they acquire on the first day of class. The professional development sessions will employ various of tools and techniques to actively engage teachers, including a PowerPoint presentation, reflection journaling, guided discussions in both large and small groups, video segments, and dedicated time for collaborative planning. The agenda and sequence of the professional development program are detailed in Appendix A.

Roles and Responsibilities

The facilitator's responsibility is to lead teachers in meaningful discussions that align with professional development goals while delivering the presentation. The principal's role is to assist the facilitator in obtaining the necessary resources for conducting professional development, offering feedback, and motivating the teachers. The teachers are encouraged to actively participate and successfully fulfill the assigned tasks, provide feedback to the facilitator, and, upon returning to their classrooms, integrate the planned action items into their teaching methods and lesson plans.

Project Evaluation

To gather feedback from educators, the workshop facilitator will conduct informal evaluations during the first two days of the professional development. These evaluations allow educators to share their thoughts on the training. At the end of each day, participants will complete an informal evaluation designed explicitly for that day's activities. The participants will write three fresh ideas they have acquired, two moments of sudden realization, and one question they still have on an index card. These evaluations will allow the facilitator to make immediate improvements to the professional development program based on the needs of the teachers. A formal evaluation will be conducted on the program's last day. At the end of the final session, all participants will be invited to complete a survey. This survey is in Appendix A on page 129 and serves as a comprehensive evaluation of the professional development program.

The summative evaluation survey assesses whether the project successfully achieved its goals by equipping teachers with the necessary information to confidently incorporate strategies that align with students' ZPD and motivation techniques into their lesson plans. According to Zepeda (2012), this evaluation process played a crucial role in addressing the day-to-day implementation of training and using the collected summative data to adjust, continue, or terminate professional development initiatives. The feedback obtained will enable the facilitator to accurately tailor the quality of professional development to support teachers in achieving the desired outcomes (Breslow & Bock, 2020). The key stakeholders involved in this process include math teachers, administrators, counselors, students, and parents. The parent-teacher organization, parent liaison, and community organizations supporting parent outreach are also considered stakeholders.

Whether the three professional goals have been achieved will rely on the information obtained from formative and summative assessments. The initial objective, which involves teachers showcasing their understanding of strategies incorporating a student's ZPD level and student motivation, will be assessed through formative and summative assessments. The summative assessment for differentiation entails a jigsaw activity where teachers extract critical elements of differentiation from article readings and share them with their teams. On the other hand, the formative assessment for explicit instruction consists of the teachers' guided notes derived from the explicit instruction video, while the summative assessment involves the creation of a 30-second video by teams explaining one aspect of explicit instruction and its application in the classroom.

The second objective is to incorporate supplementary materials, explicit instruction, and learning strategies by teachers. By working within a student's ZPD, they aim to create a lesson that aligns with the Eureka Algebra Curriculum and enhances the student's proficiency in Algebra 1 skills. In this scenario, the facilitator will ensure the attainment of this goal.

The third objective is to encourage teachers to collaborate to enhance parental engagement and tackle the problem of students' limited access to educational resources. This objective will be assessed through formal observations of participants' interactions and conversations. As part of the summative assessment, teachers organize a math night for parents, which focuses on improving parent relationships and providing resources to support students who lack resources at home.

Project Implications

Social Change

The objective of this project is to tackle the factors that impact the mathematical achievement of Algebra 1 students. By identifying research-supported best practices for teaching mathematics and addressing external influences, we can make strides in reducing the achievement gap faced by these students. Williams (2011) emphasized the importance of school districts ensuring that educators have access to top-notch professional development opportunities that focus on effective teaching techniques. Additionally, providing time for collaboration and planning is crucial to bridging the gap. Implementing a professional development series that targets effective teaching practices, addresses external factors, and promotes teacher collaboration and planning aligns with the goal of closing the achievement gap among students.

Local Community

The local community consists of various stakeholders, including students, teachers, and parents, who all share a common interest in ensuring academic success for every student, regardless of their socioeconomic status. Through the implementation of this project, teachers will gain valuable knowledge of research-based teaching techniques and strategies that support the holistic development of students. As mathematics serves as the foundation for many other subjects, students will be equipped with a strong mathematical base, enabling them to master and retain essential skills, thereby bridging the achievement gap. Ultimately, the aim is for parents to feel a sense of partnership between home and school, receive the necessary support to overcome any obstacles to success in mathematics, and empower them to confidently assist their child.

As educators witness improvements in mathematics performance and disseminate these evidence-based mathematical strategies while also fostering collaboration among schools, their peers will gradually integrate these concepts into their own teaching methods. This initiative holds the promise of extending its impact to neighboring regions. The implications for student success are even more significant. As the disparity in academic achievement diminishes, students will have increased chances to secure improved economic prospects for their families by pursuing higher education. This, in turn, will set them on a path towards accessing better career opportunities with higher salaries, ultimately uplifting both their families and communities.

Conclusion

Section 3 included a detailed overview of a comprehensive project for professional development. This project was developed based on analysis of data that were collected from 12 participant interviews and a review of lesson plan documents. Themes that were identified through data analysis were directly linked to the research question. The professional development project was designed to address existing gaps in terms of implementation of research-based strategies for teaching students in terms of their ZPD and enhance effectiveness of mathematics professional development. In addition to this, a literature review, implementation plan that addressed potential barriers, evaluation procedures, and implications for social change were also addressed. Section 4 contains reflections and conclusions of the study, strengths and limitations of the project, recommendations for alternative approaches, scholarly contributions, reflections on significance of the work, as well as implications, applications, and future research directions.

Section 4: Reflections and Conclusions

The primary objective of the established project is to enrich professional practice and facilitate meaningful conversations regarding implementation of strategies to accommodate students' ZPD during Algebra 1 mathematics instruction. Educators will have access to a secure platform where they can explore, engage in dialogue, reflect on their experiences, and evaluate their teaching methods. This will enable them to enhance their instructional techniques, replenish their resources, and enhance their ability to plan effective lessons. Through professional development and training on innovative or enhanced mathematics strategies that align with the Eureka curriculum and students' ZPD levels, teachers will have the opportunity to share and articulate their accomplishments and challenges over time.

Project Strengths and Limitations

Teachers will have the opportunity to identify and develop strategies to enhance their teaching practices in mathematics. Professional development sessions will cover methods to support implementation, improve student achievement, and include data analysis activities. Furthermore, teachers will receive resources to help increase parental involvement and reinforce homework support at home. The project involved implementation of planning practices of mathematics teachers within the school and district.

Enhancements in ongoing teacher training opportunities and access to resources have been observed in specific school districts due to the implementation of diverse curricula. Participants emphasized the necessity of a more inclusive curriculum that aligns with the needs and demographics of their students.

Recommendations for Alternative Approaches

The problem involves ongoing poor performance of students on standardized mathematics tests despite teachers' use of the Eureka curriculum since 2019. To address this issue more efficiently, I recommend increasing the number of participants. Quantitative measurements could have been used to assess themes such as lack of stakeholder collaboration, curriculum misalignment, and teacher competency.

Conducting surveys or interviews with parents would have greatly enhanced this research, allowing for a broader spectrum of perspectives. Participation of parents is crucial in terms of maintaining roles and responsibilities of educators and students. The presence of parental support cultivates a sense of responsibility among all parties who are involved. Additionally, parental support can promote transparent and honest discussions regarding necessary resources and interventions for school and home communities.

Districts that do not take advantage of programs or resources that are designed to address critical gaps in mathematics achievement are impeding student success. It is essential for both teachers and students to have access to tools and resources that allow them to effectively identify, plan, and address gaps in mathematical comprehension. Giving priority to teacher training is crucial to offering meaningful teaching and learning experiences. Carrying out surveys or observations regarding professional development and implementation practices can significantly contribute to research endeavors. By including opportunities for surveys regarding parental involvement, observations of teachers and students during math lessons, student intervention experiences, and interviews with stakeholders, districts can effectively tackle low scores on math standardized tests**.**

Scholarship, Project Development and Evaluation, and Leadership and Change

Scholarship

Throughout my time as a doctoral student at Walden University, I gained valuable insights regarding scholarly research. This educational journey not only expanded my knowledge but also provided me with a diverse range of skills that are essential for the professional growth of educators. I refined my ability to explore high-quality literature that goes beyond specific subjects, thereby enriching discussions and ensuring credibility of my work. By engaging with literature that both supports and challenges established concepts and themes, I have been able to generate numerous innovative ideas. Additionally, systematic research skills and ethical considerations I developed have become indispensable tools that I consistently employ in all decision-making processes. Research has also deepened my understanding of effective communication and collaboration. These collaborative experiences are not new but have become essential in this era of technological advancement and global health crises, particularly within the field of education.

Walden University has demonstrated a commitment to innovation by exploring various advantages of Web 2.0 tools, surpassing traditional academic practices. Online classrooms, flexible access to courses, and interactive forums have all enriched my learning journey significantly. The institution’s dedication to academic excellence has motivated me to share my passion for education with others and reignited my aspiration to effect positive change in the world. Through ethical research and community involvement, I cultivated a toolkit that has enhanced my personal growth. I will collaborate with fellow educators to share enthusiasm for professional advancement.

Project Development

During this project, I had the opportunity to innovate teaching and learning methods. I conducted a comprehensive analysis of policies, equitable practices, stakeholders, and responsibilities of curriculum developers in the education sector. This has led to numerous concepts that necessitate further assessment to ascertain their specific functionality and efficacy in terms of influencing the future of teaching and learning methodologies. I underscored the importance of using instructional techniques such as scaffolding for positive transformation. The ZPD theory, which involves deriving meaning from experiences, served as a guiding principle throughout all stages of this initiative.

Through my investigation regarding use of the Eureka mathematics curriculum by educators and its influence on student achievement, I have come to realize the importance of equitable curriculum design and teacher training. The pervasive presence of social injustices and economic disparities has been widely discussed in the media. These issues have highlighted the need for changes to ensure everyone has access to the same opportunities. The current situation demands adaptations be made to support the ongoing advancement of society.

Leadership and Change

Scholarship has been instrumental in motivating my transformation towards becoming an agent of change. Research highlighted the need for improved mathematics curricula and policy reforms. To address this, policies and procedures related to curriculum development must be reformed and personalized to cater to diverse populations. To bring about change, research on mathematical outcomes must be continued and enhanced. The documented problem of low mathematics student achievement in the United States must be acknowledged and addressed.

Educating leaders and stakeholders about needs assessments of both teachers and students, as well as potential solutions, is essential. Teachers and students are forced to work with subpar content or materials that fail to meet the needs of learners in classrooms. This situation only widens gaps involving equity. Leaders in the education field must collaborate across districts and states to obtain necessary templates for customizing mathematics curricula. These templates will greatly improve teacher implementation practices and student outcomes. Advocates play a vital role in encouraging stakeholders who are not directly involved in the classroom to make impactful decisions. It is crucial for leaders and advocates to come together and witness real classroom experiences that accurately reflect dynamics and challenges that are faced by average teachers every day.

Reflection on the Importance of the Work

Implementation of mathematics curricula and student outcomes play a vital role in the development of the world. My doctoral journey has taught me the importance of being curious about information and experiences I encountered in life. This curiosity can lead to awareness and evolution, which are essential for positive development. Through this study, I gained unbiased perspectives that challenge and justify needs for change. This has allowed me to explore global concepts and themes beyond local classrooms. Walden has improved my ability to gather and analyze evidence as well as assess the quality of data to devise resolutions and improve outcomes. I have developed patience, persistence, and a thirst for social change through my grounding in research.

The process of obtaining my doctoral degree has reinforced the significance of effective communication in my professional practice. Throughout my academic journey, I have recognized the importance of comprehending research findings and relevant elements and how they can be effectively conveyed to others. I understood that the knowledge I gained would only be valuable if it could be communicated in a manner that resonates with and holds meaning for different audiences. Consequently, I realized the need for a diverse range of communication tools that are easily accessible while also considering their direct impact on the audience. This realization further highlighted that not all audiences are the same, and resistance to communication is inevitable. In response, I developed purposeful strategies to engage with resistant individuals and adapt my approach or focus accordingly. Effective communication lies at the very core of our existence as humans, and by harnessing its power, we can continuously evolve and uplift the world around us.

Implications, Applications, and Directions for Future Research

Future research in this area should prioritize the development of curriculum design models. Curriculum developers must acknowledge the significance of tailoring the content to suit each individual teaching and learning style. Although there are numerous research-based curricula available that cater to classroom needs, they often need more personalization. To enhance the level of customization, consider the research findings of Chen et al. (2018), which emphasize the importance of recognizing the new design of the learning continuum stages. These stages involve demonstrating ideas, engaging in continuous discourse and feedback, and fostering the development of habits by incorporating existing knowledge and experiences. Creating outcome-based artifacts that reflect applied learning is also essential for interest-driven learners. By delving into the theory of interest-driven learners in mathematics, we can further facilitate the advancement of high-quality, interest-driven learners through novel and innovative approaches.

Developing an interest-driven learner necessitates a comprehensive understanding of the unique requirements of each learner. The notion of tailoring the curriculum aligns with the emerging concept of the interest-driven learner. By customizing curriculum programs, the influence of ethnicities and learning styles is automatically surpassed, and the focus shifts towards embracing the diverse global cultures we inhabit today. Customization is an essential and pertinent aspect within educational settings and districts, as it fosters awareness and equality among all learners and educators. As developers and stakeholders design programs for districts catering to diverse communities, it is imperative to address equitable measures in future research (Daniel et al., 2019).

Future research should delve into theories about mathematical identity. Exploring the dispositions of different cultures or ethnicities could prove advantageous in meeting the requirements for enhancing the development of mathematics curriculum and customization (Lin, 2019). By offering customizable mathematics curricula, curriculum developers contribute to promoting equity on a global scale. Stakeholders can initiate the quest for a mathematics curriculum developer with diverse skills and aligned resources to cater to specific student audiences. Recognizing and prioritizing mathematics identities can be crucial in tackling equity and accessibility concerns in mathematics classrooms worldwide.

In future studies, it is essential to consider additional factors related to time or timing challenges. Educators have identified timing as a significant area of difficulty or disadvantage. They believe that the limited time allocated for mathematics instruction, along with other demands within the mathematics block, raises concerns about effective implementation and student performance. Conducting a more thorough examination of the issues surrounding time or the utilization of time could prove advantageous for mathematics instruction, student achievement, and teacher training (Patall et al., 2010). This research could have been enhanced by allocating more time for in-depth participant interviews and observing instructional implementation.

This website and others are undergoing significant educational advancements, specifically in constructing 21st-century buildings. These transitions can potentially contribute to the implementation and outcomes of education in various ways. Introducing of new features and the necessity for specialized professional development training for such buildings can potentially result in more effective teaching practices in mathematics and improved student achievement (Infocomm Media Development Authority, n.d.). Teachers at this site and educators worldwide can benefit from continuous professional development programs focusing on strategies to increase a student's ZPD level. It is crucial for teacher training to mirror the technology-enhanced tools and resources that will be accessible to students (McAleavy & Fitzpatrick, 2021). Despite the challenges posed by the COVID-19 pandemic, which has forced technology to play a more prominent role in mathematics instruction, it remains essential for teachers to possess proficiency in utilizing technology. Further research is necessary to support and enhance teachers' proficiency levels in effectively integrating technology into mathematics classrooms.

Conclusion

Mathematics is an indispensable skill in the realm of education and learning. It serves as the foundation for various aspects of our lives and development. Although the implementation of mathematics may differ globally, it remains a crucial factor in the reasoning and proficiency levels of individuals in our society. The subject of mathematics plays a significant role in advancing our society in fields such as science, medicine, technology, and commerce. It also helps cultivate a problem-solving mindset that enhances our comprehension of the structures and systems surrounding us.

In a world where technology allows for the customization of everything from shoes to portable devices, the same concept must be applied to the revision of curriculum selections, educational policies, and systems. Stakeholders must assess the resources, tools, and methodologies presently required for decision-making and their anticipated effects on those who receive them. This assessment should encompass the mathematics curriculum writers and their capacity to analyze districts and communities extensively, considering their tangible requirements and achievements. Mathematics curriculum writers should be able to offer adaptable choices within curriculum development that enhance proficiency levels instead of hindering them.

The necessity for mathematics curricula to be tailored to specific demographics, learning styles, and levels is evident in the underwhelming mathematics scores observed in this nation. Curricula must incorporate active flexibility that allows teacher input and intervention practices to address predictable errors, regardless of skill or experience. Mathematic curriculum writers should anticipate potential issues and provide solutions catering to novice and veteran teachers. By including these accessible tools in mathematics curricula, the implementation process can be improved for all. Ultimately, the aim is to create a more equitable academic and social environment that fosters the development of future leaders in classrooms.

Future research should delve into theories pertaining to mathematical identity. Exploring the dispositions of different cultures or ethnicities could prove advantageous in meeting the requirements for enhancing the development of mathematics curriculum and customization (Lin, 2019). By offering customizable mathematics curricula, curriculum developers contribute to promoting equity on a global scale. Stakeholders can initiate the quest for a mathematics curriculum developer who possesses a diverse range of skills and aligned resources to cater to specific student audiences. Recognizing and prioritizing mathematics identities can play a crucial role in tackling equity and accessibility concerns in mathematics classrooms worldwide.

In future studies, it is important to consider additional factors related to time or timing challenges. Educators have identified timing as a significant area of difficulty or disadvantage. They believe that the limited time allocated for mathematics instruction, along with other demands within the mathematics block, raises concerns about effective implementation and student performance. Conducting a more thorough examination of the issues surrounding time or the utilization of time could prove advantageous for mathematics instruction, student achievement, and teacher training (Patall et al., 2010). This research could have been enhanced by allocating more time for in-depth interviews with participants and by having the opportunity to observe instructional implementation.

Louisiana Believes website and others are currently undergoing significant advancements in school development, specifically in the construction of 21st-century buildings. These transitions have the potential to contribute to the implementation and outcomes of education in various ways. The introduction of new features and the necessity for specialized professional development training for such buildings can potentially result in more effective teaching practices in mathematics and improved student achievement in this subject (Infocomm Media Development Authority, n.d.). Teachers at this site, as well as educators worldwide, can greatly benefit from continuous professional development programs that focus on strategies that will increase a student's ZPD level. It is crucial for teacher training to mirror the technology-enhanced tools and resources that will be accessible to students (McAleavy & Fitzpatrick, 2021). Despite the challenges posed by the COVID-19 pandemic, which has forced technology to play a more prominent role in mathematics instruction, it remains essential for teachers to possess proficiency in utilizing technology. Further research is necessary to support and enhance teachers' proficiency levels in effectively integrating technology into mathematics classrooms.

References

Adeyinka, O. L., Temiloluwa, J. E., & Chioma, A. A. (2022). Individual parental involvement versus peer relationships influences on student academic achievement in biology. *Research and Analysis Journal*, *5*(9), 06-12. https://doi.org/10.18535/raj.v5i9.336

Adler, J., & Venkat, H. (2020). Subject matter knowledge within "mathematical knowledge for teaching". *Encyclopedia of Mathematics Education*, 817-820. https://doi.org/10.1007/978-3-319-77487-9_98-3

Agarwal, M., & Shrivastava, N. (2020). *Pedagogy, instructional strategies and effective teaching*. http://www.casirj.com/

Agasisti, T., Avvisati, F., Borgonovi, F., & Longobardi, S. (2021). What school factors are associated with the success of socio-economically disadvantaged students? An empirical investigation using PISA data. *Social Indicators Research*, *157*(2), 749-781. https://link.springer.com/article/10.1007/s11205-021-02668-w

Alkin, M. C., & Stecher, B. M. (1981, April 13). *Evaluation information use by site-level decision makers: Methodological issues*. https://eric.ed.gov/?id=ED202890

Allensworth, E. M., & Clark, K. (2020). High school GPAs and ACT scores as predictors of college completion: Examining assumptions about consistency across high schools. *Educational Researcher*, *49*(3), 198-211. https://eric.ed.gov?id=Ed607177

Alrajeh, T. S., & Shindel, B. W. (2020). Student engagement and math teachers support. *Journal on Mathematics Education*, *11*(2), 167-180.

https://eric.ed.gov/?q=relationships+and+personality%2c+and+emotional+and+labor&pg=105&id=EJ1252000

Arcallana, P. R., Etcuban, J. O., Dinauanao, A. M., & Macugay, P. J. (2018). Early predictors of high school mathematics achievements for grade 9 students in a public high school. *International Journal of Advanced Research and Publication, 2*(6), 6-15. http://www.ijarp.org/published-research-papers/june2018/Early-Predictors-Of-High-School-Mathematics-Achievements-For-Grade-9-Students-In-A-Public-High-School.pdf

Ashurova, G., Meliqo'ziyeva, M., & Karimova, S. (2019). Reforms in the field of preschool education. *European Journal of Research and Reflection in Educational Sciences, 7*(12). http://www.idpublications.org/wp-content/uploads/2019/12/Full-Paper-Reforms-in-the-Field-of-Preschool-Education.pdf

Ávalos, B. (2011). Teacher professional development in teaching and teacher education over ten years. *Teaching and Teacher Education, 27*, 10-20.

Barton, A., Ershadi, M., & Winthrop, R. (2021). *Understanding the connection between family-school engagement and education system transformation: A review of concepts and evidence*. Brookings Institution. https://www.brookings.edu/wp-content/uploads/2021/10/Understanding_The_Connection_FINAL.pdf

Bas, G., & Sentürk, C. (2019). Teaching-learning conceptions and curriculum fidelity: Relational research. *International Journal of Curriculum and Instruction*, 11(2), 163–180. https://eric.ed.gov/?id=EJ123277

Black, S., & Allen, J. D. (2018). Part 5: Learning is a social act. *Reference Librarian*, *59*(2), 76-91. https://doi.org/10.1080/02763877.2017.1400932

Breslow, N., & Bock, G. (2020). Evaluating professional learning: A tool for schools and districts. https://ies.ed.gov/ncee/edlabs/regions/northeast/pdf/NE_5.3.5_Evaluation_PD_Brief_12-22-20_accessible.pdf

Bullock, E. C. (2019). Mathematic curriculum reform as racial remediation: A historical counter-story. In *Critical race theory in mathematics education* (pp. 75-97). Routledge.

Busetto, L., Wick, W., & Gumbinger, C. (2020). How to use and assess qualitative research methods. *Neurological Research and Practice*, *2*(1), 1-10. https://pubmed.ncbi.nlm.nih.gov/33324920/

Butler, K. (2019, April 13). (PDF) A brief review of research on forms of instruction. https://www.researchgate.net/publication/348805032_A_Brief_Review_of_Research_on_Forms_of_Instruction

Carbonneau, K. J. (2020). Teacher judgments of student mathematics achievement: The moderating role of student-teacher conflict. *Educational Psychology*, *40*(10), 1211-1229. https://doi.org/10.1080/01443410.2020.1768223

Cardino, J. M., & Ortega-Dela Cruz, R. A. (2020). Understanding of learning styles and teaching strategies towards improving the teaching and learning of mathematics. *LUMAT: International Journal on Math, Science, and Technology Education*, *8*(1). https://doi.org/10.31129/lumat.8.1.1348

Chen, L., Bae, S. R., Battista, C., Qin, S., Chen, T., Evans, T. M., & Menon, V. (2018). Positive attitude toward math supports early academic success: Behavioral evidence and neurocognitive mechanisms. *Psychological Science*, *29*(3), 390–402. https://doi.org/10.1177/0956797617735528

Christmas, D., Kudzai, C., & Josiah, M. (2013). Vygotsky's zone of proximal development theory: What are its implications for mathematical teaching? *Greener Journal of Social Sciences*, *3*(7), 371-377. https://pdf4pro.com/view/vygotsky-s-zone-of-proximal-development-theory-what-are-3df0fe.html

Clark-Wilson, A., Robutti, O., & Thomas, M. (2020). Teaching with digital technology. *International Journal on Mathematics Education*, 52. 1223–1242. https://doi.org/10.1007/s11858-020-01196-0

Clements, D. H., Fuson, K. C., & Sarama, J. (2019). Research commentary: Critiques of the common core in early math: A research-based response. *Journal for Research in Mathematics Education*, *50*(1), 11-22. https://www.jstor.org/stable/pdf/10.5951/jresematheduc.50.1.0011.pdf?refreqid=excelsior%3A4710a0914e4826aae68939801bf234a5

Coghlan, D. (2016). Retrieving a philosophy of practical knowing for action research. *International Journal of Action Research*, *12*(1). https://www.budrich-journals.de/index.php/ijar/article/view/26634

Connelly, F. M., & Clandinin, D. J. (1986). On narrative method, personal philosophy, and narrative unities in the story of teaching. *Journal of Research in Science Teaching*, *23*(4), 293-310. https://doi.org/10.1002/tea.3660230404

Cooper, J., & Lavie, I. (2021). Bridging incommensurable discourses–A cognitive look at instructional design in the zone of proximal development. *The Journal of Mathematical Behavior, 61*, 100822. https://doi.org/10.1016/j.jmathb.2020.100822

Common Core State Standards Initiative (2017). Common core state standards initiative. https://learning.ccsso.org/common-core-state-standards-initiative

Corestandards. (2021). Common Core State Standards Initiative. Preparing America's Students for College & Career. http://www.corestandards.org.

Cosby, M., Horton, A., & Berzina-Pitcher, I. (2017). Math is all around us: Explore the teaching, learning, and professional development of three urban mathematics teachers. *Journal of Computers in Mathematics & Science Teaching*, 36(3), 287–305.

Courtney, S. A. (2018). Teacher-educator-embedded professional learning model. *International Electronic Journal of Mathematics Education*, *13*(3), 103-123. https://files.eric.ed.gov/fulltext/EJ1227348.pdf

Crossman, A. (2020). An overview of qualitative research methods. Direct observation, interviews, participation, immersion, and focus groups. Thought Co. https://www.thoughtco.com/qualitative-research-methods-3026555

Creswell, J. (2003). Research design: qualitative, quantitative, and mixed-methods approaches (2nd ed.). Thousand Oaks, CA: Sage.

Creswell, J. (2007). Qualitative inquiry and research design: choosing among five traditions. Thousand Oaks, CA: Sage.

Creswell, J. (2008). Research design: Qualitative, quantitative & mixed methods approaches (3rd ed.). Thousand Oaks, CA: Sage.

Daniel, J., Quartz, K. H., & Oakes, J. (2019). Teaching in community schools: Creating conditions for deeper learning. *Review of Research in Education*, *43*(1), 453–480. https://doi.org/10.3102/0091732x18821126

Darling-Hammond, L., Hyler, M. E., & Gardner, M. (2017). *Effective teacher professional development.* Learning Policy Institut

Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B., & Oshner, D. (2020). Implications for educational practice of the science of learning and development. *Applied Developmental Science*, *24*(2), 97-140. https://doi.org/10.1080/10888691.2018.1537791

Denzin, Norman K., and Yvonna S. Lincoln. "Introduction: The discipline and practice of qualitative research."(2008).

Deppa, K. (2022, June 9). *Is "Drill and kill" The only kind of practice?* CentralReach. https://centralreach.com/is-drill-and-kill-the-only-kind-of-practice

Eun, B. (2019). Adopting a stance: Bandura and Vygotsky on professional development. *Research in Education*, *105*(1), 74-88. https://doi.org/10.1177/0034523718793431

Evans, D., & Field, A. P. (2020). Predictors of mathematical attainment trajectories across the primary-to-secondary education transition: parental factors and the home environment. *Royal Society open science*, *7*(7), 200422. https://royalsocietypublishing.org/doi/pdf/10.1098/rsos.200422

Fani, T., & Ghaemi, F. (2011). Implications of Vygotsky's zone of proximal development (ZPD) in teacher education: ZPTD and self-scaffolding. *Procedia-Social and Behavioral Sciences*, *29*, 1549-1554.

Francisco, C.D., & Celon, L.C. (2020). Teachers' Instructional Practices and Its Effects on Students' academic performance https ://doi.org/10.1016/j.sbspro.2011.11.396

Great Minds PBC. (2022). *Eureka math teacher resource pack - great minds*. Great Minds. https://greatminds.org/math/eurekamath/teacher-resource-pack

Greenleaf, C., Litman, C., & Marple, S. (2018). The impact of inquiry-based professional development on teachers 'capacity to integrate literacy instruction in secondary subject areas. *Teaching and Teacher Education*, 71, 226–240. https://doi.org/10.1016/j.tate.2018.01.00

Hasselle, D. (2019). Nearly half of New Orleans' all-charter district schools got D or F grades; what happens next. https://www.nola.com/news/education/nearly-half-of-new-orleans-all-charter-district-schools-got-d-or-f-grades-what/article_0c5918cc-058d-11ea-aa21-d78ab966b579.html

Hatisaru, V. (2020). Secondary mathematics teachers' content knowledge for teaching the concept of function. *International Journal for Mathematics Teaching and Learning*, *21*(1), 94-119. https://eric.ed.gov/?id=EJ1268957

Hawes, Z., Moss, J., Caswell, B., Seo, J., & Ansari, D. (2019). Relations between numerical, spatial, and executive function skills and mathematics achievement:

A latent-variable approach. *Cognitive Psychology*, *109*, 68-90. https://psycnet.apa.org/doi/10.1016/j.cogpsych.2018.12.002

Horan, E., & Carr, M. (2018). *A review of guidance and structure in elementary mathematics instruction*. The University of Georgia.

Horn, I. S., Garner, B., Kane, B. D., & Brasel, J. (2017). A taxonomy of instructional learning opportunities in teacher-workgroup conversations. *Journal of Teacher Education*, 68(1), 41–54. https://doi.org/10.1177/002248711667631

Houle, J. N., & Addo, F. R. (2019). Racial disparities in student debt and the reproduction of the fragile black middle class. *Sociology of Race and Ethnicity*, *5*(4), 562-577. https://doi.org/10.1177/2332649218790989

Infocomm Media Development Authority. (n.d.). https://www.imda.gov.sg/about-imda/corporate-publications/annual-reports

Irizarry, Y. (2021). On track or derailed? Race, advanced math, and the transition to high school. *Socius*, *7*, 2378023120980293. https://doi.org/10.1177/2378023120980293

Jacob, R., Hill, H., & Corey, D. (2017). The impact of a professional development program on teachers' mathematical knowledge for teaching, instruction, and student achievement. *Journal of Research on Educational Effectiveness*, *10*(2), 379-407. https://doi.org/10.1080/19345747.2016.1273411

Jayanthi, M., Gersten, R., Taylor, M. J., Smolkowski, K., & Dimino, J. (2017). *Impact of the developing mathematical ideas professional development program on grade 4 students' and teachers' understanding of fractions*. REL 2017-256 (pp. 15–16).

ERIC. https://eric.ed.gov/?id=ED573110

Jiang, Y., Wu, Y., Sha, X., & Xu, Y. (2022). The ZPD perspective on teachers' question-answer strategies in the mathematics classroom. *Highlights in Business, Economics, and Management*, *4*, 292–298. https://doi.org/10.54097/hbem.v4i.3506

Kamin, D. C. (2016). The Common Core State Standards for Mathematics and College Readiness. *The Mathematics Educator*, *26*(Special Issue), 52-70. https://files.eric.ed.gov/fulltext/EJ1142886.pdf

Karsenty, R. (2021). Implementing professional development programs for mathematics teachers at scale: what counts as success? *ZDM Mathematics Education*, 53, 1021–1033. https://doi.org/10.1007/s11858-021-01250-5

Kelly, A. E. (2008). Reflections on the national mathematics advisory panel final report. *Educational Researcher*, *37*(9), 561-564. https://www.jstor.org/stable/25209055

Koedel, C., & Li, D. (2017). Mathematics curriculum effects on student achievement in California. *National Science Foundation*. https ://doi.org/10.1177%2F2332858417690511

Koichu, B., Zaks, R., & Farber, M. (2020). Teachers' voices from two communities of 133 inquiry engaged in practices of mathematics education research. In H. Borko & D. Potari (Eds.), *Teachers of mathematics working and learning in collaborative groups: Proceedings of the 25th ICMI Study Conference* (pp. 364–371). ICMI.

Kraft, M. A., Brunner, E. J., Dougherty, S. M., & Schwegman, D. J. (2020). Teacher accountability reforms and the supply and quality of new teachers. *Journal of Public Economics, 188*, 104212. https://scholar.harvard.edu/mkraft/publications/teacher-evaluation-reforms-and-supply-and-quality-new-teachers

Kul, U. (2018). Influences of technology-integrated professional development courses on mathematics teachers. *European Journal of Educational Research,* 7(2), 233–243.

Kutaka, T., Smith, W., Albano, A., Edwards, C., Ren, L., Beattie, H., & Stroup, W. (2017). Connecting teacher professional development and student mathematics achievement: A 4-year study of an elementary mathematics specialist program. *Journal of Teacher Education*, 68(2), 140–154.

Kvale, S., & Brinkmann, S. (2009). *Interviews: Learning the Craft of Qualitative Research Interviewing*. Sage. https://psycnet.apa.org/record/2008-15512-000

Lacour, M., and L.D. Tissington (2011). The effects of poverty on academic achievement. *Educational Research and Reviews*, 8(7): p. 522-527.

Lampert, M. (1985). How do teachers manage to teach? Perspectives on problems in practice. *Harvard Educational Review*, *55*(2), 178-195. https://psycnet.apa.org/record/1986-12912-001

LeCompte, M. D., & Millroy, W. L. (Eds.). (1992). *The handbook of qualitative research in education*. Academic Press.

Lee, S. W., & Mao, X. (2021). Algebra by the eighth grade: The association between early study of algebra I and students' academic success. *International Journal of*

Science and Mathematics Education, *19*(6), 1271-1289. https://doi.org/10.1007/s10763-020-10116-3

Lefstein, A., Vedder-Weiss, D., & Segal, A. (2020). Relocating Research on Teacher Learning: Toward Pedagogically Productive Talk. *Educational Researcher*, 49(5), 360–368. https://doi.org/10.3102/0013189X20922998

Legg, T. (2020). What is the Zone of Proximal Development? Healthline https://www.healthline.com/health/zone-of-proximal-development

Lin, C. (2019). Understanding cultural diversity and diverse identities. *Encyclopedia of the UN Sustainable Development Goals*, 1–10. https://doi.org/10.1007/978-3-319-69902-8_37-1

Lincoln, Y., & Guba, E. G. (1985). Naturalistic inquiry. Beverly Hills, CA: Sage.

Littleton, K., & Mercer, N. (2013). Interthinking: Putting talk to work. London: Routledge.

Louisiana Believes-Louisiana Department of Education. (2018). Louisiana Believes Louisiana Department of Education (n.d,) Retrieved 2018 from https ://www.louisianabelieves.com/

Louisiana Believes-Louisiana Department of Education. (2019). Louisiana Believes Louisiana Department of Education (n.d,) Retrieved 2019 from https ://www.louisianabelieves.com/

Louisiana Believes-Louisiana Department of Education. (2020). Louisiana Believes Louisiana Department of Education (n.d,) Retrieved 2020 from https ://www.louisianabelieves.com/

Louisiana State University. (2022). LSU professor helps create innovation PK-12 math curriculum. LSU.ed. https://www.lsu.edu/science/news_events/cos-news-events/news-events-2015/EurekaMath.php

McAleavy, T., & Fitzpatrick, R. (2021a). Promising practice in government schools in Vietnam. *Implementing Educational Reform*, 127–148. https://doi.org/10.1017/9781108864800.008

Maharani, I. P., & Subanji, S. (2018). Scaffolding based on cognitive conflict in correcting the students' algebra errors. *International Electronic Journal of Mathematics Education*, *13*(2), 67-74. https://files.eric.ed.gov/fulltext/EJ1227504.pdf

Maheshwari, V. K. (n.d.). *Phases of teaching*. Dr VK Maheshwari PhD. Retrieved August 1, 2022, from http://www.vkmaheshwari.com/WP/?p=424

Martin, D. B. (2019). Equity, inclusion, and antiblackness in mathematics education. *Race Ethnicity and Education*, *22*(4), 459-478. https://doi.org/10.1080/13613324.2019.1592833

Mathaba, P. N., & Bayaga, A. (2019). *Errors and misconceptions related to learning algebra in the senior phase–grade 9* (Doctoral dissertation, University of Zululand).

Maxwell, J. A. (1996). *Qualitative research: an interactive approach*. Thousand Oaks, CA: Sage.

Maxwell, J. A. (2012). *Qualitative research design: an interactive approach*. Thousand Oaks, CA. Sage publications.

McGee, J. R., Chuang, W., & Drew, P. (2013). Guiding teachers in the use of a standards-based mathematics curriculum: teacher perceptions and subsequent instructional practices after an intensive professional development program. *School Science and Mathematics*, 113(1), 16–28.

McLeod, S. (2019). The zone of proximal development and scaffolding. *Recuperado el.* https://safepilots.org/wp-content/uploads/ZoneOfProximalDevelopment.pdf

McMullen, K. M. (2018). *Teacher factors and the impact on student success in Algebra* I at Liberty University. https://digitalcommons.liberty.edu

Miles, M., Huberman, M., & Saldaña, J. (2014). Qualitative data analysis: A methods sourcebook (3rd edn). Sage.

Mohajan, H. K. (2018). Qualitative research methodology in social sciences and related subjects. *Journal of economic development, environment, and people*, *7*(1), 23-48. https://mpra.ub.uni-muenchen.de/85654/1/MPRA_paper_85654.pdf

Myers, K. D., Swars, S., Smith, S. Z., Smith, M. E., & Fuentes, D. S. (2020). Developing the pedagogical capabilities of elementary mathematics specialists during a K–5 mathematics endorsement ecogram. *Journal of Teacher Education*, 71(2), 261– 274. https://doi.org/10.1177/0022487119854437

National Center for Education Statistics. (2019). *The condition of education*. https://nces.ed.gov/programs/coe/

Nation Report Card Mathematics Assessment Content. (2020). The Nation's Report Card NAEP. (n.d.). Retrieved January 3, 2021, from https://nces.ed.gov/nationsreportcard/

Ndemo, Z., & Ndemo, O. (2018). Secondary school students' errors and misconceptions in learning algebra. *Journal of Education and Learning*, *12*(4), 690-701. https://archive.org/details/secondary-school-students-errors-and-misconceptions-in-learning-algebra/mode/1up

Neufville, M. E. (2019). Perspectives of mathematically proficient black high school students with a history of underachievement in mathematics. https://fisherpub.sjf.edu/cgi/viewcontent.cgi?article=1432&context=education_etd

Ngo, F. J., & Velasquez, D. (2020). Inside the math trap: chronic math tracking from high school to community college. *Urban Education*, https://doi.org/10.1177/0042085920908912

Niemelä, M. (2022). Knowledge-based curriculum integration: potentials and challenges for teaching and curriculum design. *Helsinki Studies in Education*. https://www.researchgate.net/publication/361488959

Noto, M. S., Pramuditya, S. A., & Handayani, V. D. (2020). Exploration of learning obstacles based on mathematical understanding of algebra in junior high school. *Eduma: Mathematics Education, Learning, and Teaching*, *9*(1), 14-20. https://media.neliti.com/media/publications/413783-none-797dc916.pdf

Olagbaju, O. O., & Nnorom, S. U. (2019). Effects of class size and peer influence on senior secondary students' achievement. *Quest.* https://www.jrest.net/index.php/jrest/article/view/39

Oliveira, A. W., Meskill, C., & Yasrebi, S. (2020). Improving Algebra teachers' ability to factor in language: Complementary expertise in action. In *Teaching Mathematics to English Language Learners* (pp. 73-92). Palgrave Macmillan, Cham.

Osman, D.J., & Warner, J.R. (2020). Measuring teacher motivation: The missing link between professional development and practice. *Teaching and teacher education*.

Parsad, B. (2003). *Remedial education at degree-granting postsecondary institutions in fall 2000*. National Center for Education Statistics, US Department of Education, Institute of Education Sciences. https ://nces.ed.gov/pubs2004/2004010.pdf

Patall, E. A., Cooper, H., & Wynn, S. R. (2010). The effectiveness and relative importance of choice in the classroom. *Journal of Educational Psychology*, *102*(4), 896–915. https://doi.org/10.1037/a0019545

Pepin, B. (2020). Quality of (digital) resources for curriculum innovation. In Proceedings of the 10th ERME Topic Conference MEDA 2020 (pp. 19-26). Linz (Austria). https://hal.archives-ouvertes.fr/hal-02932218

Pepin, B., and Gueudet, G. (2018). Curriculum Resources and Textbooks in Mathematics Education. In: Lerman, S. (eds) Encyclopedia of Mathematics Education. Springer, Cham. https://doi.org/10.1007/978-3-319-77487-9_40-7

Polikoff, M. S., Campbell, S., Rabovsky, S., Koedel, C., Lê, Q. T., Hardaway, T., & Gasparian, H. (2020). The formalized processes districts use to evaluate mathematics textbooks. Journal of Curriculum Studies, 52(4), 451-477.

Polly, D. (2018). Examining how professional development influences elementary teachers enacted instructional practices and students' evidence of mathematical understanding. *Journal of Research in Childhood Education*, 7(29) 565–582. https://doi.org/10.80/02568543.2015.1073798

Porter, A., McMaken, J., Hwang, J., & Yang, R. (2011). Common core standards: the U.S. intended curriculum. Educational Researcher, 40(3), 103-116. https://psycnet.apa.org/doi/10.3102/0013189X11405038

Putra, R., Fauzan, A., & Habibi, M. (2019). The impact of cognitive conflict-based learning tools on students mathematical problem-solving abilities. https://www.semanticscholar.org/paper/The-Impact-of-Cognitive-Conflict-Based-Learning-on-Putra-Fauzan/217c24a9886b7471c4d8fa082857654b9ca54bcf

Quain, S. (2020). The four levels of the zone of proximal development. https://classroom.synonym.com/four-stages-zone-proximal-development-8709534.html

Rajaram, K. (2020). Learning design: effective adaptation of instructional techniques to enhance the learning process. Educating Mainland Chinese Learners in Business Education, 147–173

Rezat, S., Fan, L., & Pepin, B. (2021). Mathematics textbooks and curriculum resources as instruments for change. *ZDM – Mathematics Education, 53*, 1189 - 1206.

Richards, E. (2020). Math scores stink in America. Other countries teach it differently—and see higher achievement. *https://www.usatoday.com/story/news/education/2020/02/28/math-scores-high-*

school-lessons-freakonomics-pisa-algebra-geometry/4835742002/

Ring, E. A., Dare, E. A., Crotty, E. A., & Roehrig, G. H. (2017). The evolution of teacher conceptions of STEM education throughout an intensive professional development experience. *Journal of Science Teacher Education*, 28(5), 444–467.

Riggleman, J. S. (2017). Effectiveness of essentials for college math as a high school transitional course. https://mds.marshall.edu/cgi/viewcontent.cgi?article=2126&context=etd

Sancar, R., Atal, D., & Deryakulu, D. (2021). A new framework for teachers' professional development. *Teaching and Teacher Education, 101*, 103305.

Savage, D., Tsemenhu, R., Green, R., Truby, W., & Stelzer, J. (2018). Implementation of common core state standards for mathematics with African American and Hispanic American students: Successful common practices. *National Teacher Education Journal*, *11*(2). https://www.rand.org/pubs/occasional_papers/OP384.html

Schneider, M. (2019). A Great Minds (Common Core, Inc.) History: Eureka Math, Wit & Wisdom, and More. Louisiana Department of Education. https://nonpartisaneducation.com/2019/10/07/a-great-minds-common-core-inc-history-eureka-math-wit-wisdom-and-more/

Schwarts, G. (2020). Facilitating collaborative professional development for the first time. In H. Borko & D. Potari (Eds.), *Teachers of mathematics working and learning in collaborative groups: Proceedings of the 25th ICMI Study Conference* (pp. 540–547). ICMI.

Seidman, I. (2013). Interviewing as qualitative research: A guide for researchers in education and the social sciences (4th ed.). New York, NY: Teachers College Press.

Sharpe, S. T., & Marsh, D. D. (2022). A systematic review of factors associated with high schoolers' algebra achievement according to HSLS:09 results. *Educ Stud Math* (2022). https://doi.org/10.1007/s10649-021-10130-4

Silinskas, G., & Kikas, E. (2019). Parental involvement in math homework: Links to children's performance and motivation. *Scandinavian Journal of Educational Research, 63*(1), 17–37. https://doi.org/10.1080/00313831.2017.1324901

Sims, S., & Fletcher-Wood, H. (2020). Identifying the characteristics of effective teacher professional development: a critical review. *School Effectiveness and School Improvement, 32*, 47 - 63.

Siyepu, S. (2013). The zone of proximal development in the learning of mathematics., (2), 1–13. https://doi.org/10.15700/saje.v33n2a714 [Crossref], [Web of Science ®], [Google Scholar]

Spadafora, N., & Downs, T. (2019). *Scaffolding learning*. Springer.

Stone, C.A. (1993). What is missing in the metaphor of scaffolding? Oxford University Press, New York, pp. 169-183

Tabun, H. M., Taneo, P. N. L., & Daniel, F. (2020). The ability of students to learn math literacy through a problem-based learning model. Eduma: Mathematics Education, Learning, and Teaching,9(1),43.https://www.semanticscholar.org/paper/The-Ability-of-

Student-Math-Literation-on-Problem-Tabun-Taneo/4dfab361665857d9562c954198c594d0cf5159d1

Tan, C.Y., Lyu, M., & Peng, B. (2020). Academic Benefits from Parental Involvement are Stratified by Parental Socioeconomic Status: A Meta-analysis. *Parenting*, *20*, 241 - 287.

Tang, H. (2020). A qualitative inquiry of k–12 teachers' experience with open educational practices: Perceived benefits and barriers of implementing open educational resources. *The International Review of Research in Open and Distance Learning*, *21*(3), 211–229.

Tekkumru-Kisa, M., Stein, M. K., & Doyle, W. (2020). Theory and research on tasks revisited: Tasks as a context for students' thinking in the era of ambitious reforms in mathematics and science. *Educational Researcher*, *49*(8), 606–617. https://doi.org/10.3102/0013189X20932480

Terhart, E. (2013). Teacher resistance against school reform: Reflecting an inconvenient truth. *School Leadership & Management*, *33*(5), 486-500. https://doi.org/10.1080/13632434.2013.793494

Tinungki, G. M. (2019). Zone proximal development gives a new meaning to the student's intelligence in statistical methods. Journal of Honai Math. 2. 129-142. https://www.researchgate.net/publication/335165380_

van de Pol, J., Mercer, N., & Volman, M. (2018). Scaffolding student understanding in small-group work: Students' uptake of teacher support in subsequent small-group interaction. *Journal of the Learning Sciences*, *28*(2), 206–239.

https://doi.org/10.1080/10508406.2018.1522258

Vasileiou, K., Barnett, J., Thorpe, S., & Young, T. Characterising and justifying sample size sufficiency in interview-based studies: systematic analysis of qualitative health research over a 15-year period. *BMC Med Res Methodol* **18**, 148 (2018). https://doi.org/10.1186/s12874-018-0594-7

Vygotsky. (1978). *Mind in society: Development of higher psychological processes*. Harvard university press.

Walsha, M. (2017). Understanding mathematical development through Vygotsky. Research in Mathematics Education 19(2): 1-17.DOI:10.1080/14794802.2017.1379728

Weber, K., Dawkins, P., & Mejía-Ramos, J. P. (2020). The relationship between mathematical practice and mathematics pedagogy in mathematics education research. *ZDM*, *52*(6), 1063-1074. https://eric.ed.gov/?id=EJ1266960

Wedekind, V. (2019). Curriculum responsiveness and student employability. An institutional analysis. https://www.semanticscholar.org/paper/Curriculum-responsiveness-and-student-An-analysis-Wedekind/472ee3491acfbdd41d3409a3a6d0a33ccae5bced

Williams, C. (2011). Research Methods. Journal of Business and Economics Research, 5.

Yetman, D. (2020, March 24). *Zone of proximal development relation to children's education*. Healthline. https://www.healthline.com/health/zone-of-proximal-development

Yildirim, M. (2019). Mediating role of resilience in the relationships between fear of happiness and affect balance, satisfaction with life, and flourishing. *Europe's Journal of Psychology, 15*(2), 183–198.

Yu, R., & Singh, K. (2018). Teacher support, instructional practices, student motivation, and mathematics achievement in high school. *The Journal of Educational Research*, *111*(1), 81-94. https://psycnet.apa.org/doi/10.1080/00220671.2016.1204260

Zepeda, S. J. (2012). Instructional supervision: Applying tools and concepts (3rd ed.). Larchmont, NY: Eye on Education.

Appendix A: The Project

Goals

The goals of the professional development series are as follows:

- **Goal 1:** Demonstrate the process of creating lesson plans that incorporate specific strategies for a math lesson, taking into consideration the content, a student's ZPD level, and the learning environment.
- **Goal 2:** Illustrate the components of the Eureka Algebra 1 Curriculum and explain how additional materials can be integrated into daily math lesson plans to support a student's ZPD level.
- **Goal 3:** Identify the external factors that influence students' learning processes and develop effective strategies to minimize their impact.

Learning Outcomes

During this professional development series, teachers will:

- Design lesson plans reflecting strategies that will be used during a math lesson based on content, a student's ZPD level, and the learning environment.
- Select skills from the Eureka Algebra 1 Curriculum and integrate supplementary materials into a daily mathematics session to enhance a learner's ZPD level.
- Develop effective strategies to address external factors that impact student learning.

Audience

The primary focus audience for this professional development series will be Algebra 1 high school math teachers who use the Eureka Algebra 1 Curriculum.

Table A1

Professional Development Timeline Day 1 and 2

Time	Day 1	Day 2
8:30-9:00	Introductions, norms, distribution of notebook gift	Introductions new facilitators/teachers and share out from reflections or evaluation
9:00- 9:30	Reflection notebooks – reflect on struggling math students and put a face to our concerns	Reflection notebooks – think of lesson that went well versus a lesson that bombed. Discuss lessons learned
9:30- 10:00	Session 1: Discussion of a student's ZPD level and what it means to teachers. (Picture draw activity & share)	Session 3: Explicit Instruction (video stops and talks + chart) Teachers take guided notes
10:00-10:45	Jigsaw article on two different articles to find key components of effectively teaching within a student's ZPD level.	Teachers make 30 sec ad spots to explain one component of ZPD and how it applies in the classroom.
10:45-11:00	15 Min Break	15 Min Break
11:00-11:30	Presentation on how to teach math within a student's ZPD level.	Work Time: teachers use this time using the components of ZPD to plan out a lesson form the Eureka Algebra 1 Curriculum in collaborative groups.
11:30-12:15	Teacher chooses one standard and discuss how this standard could be taught within a student's ZPD level.	Share out example lessons and teams provide feedback.
12:15-1:15	Lunch	Lunch
1:15-1:45	Session 2: Accessibility Strategies Video + Reflection (TPS)	Session 3: Student Motivation Reflection books – what do students say negatively about math versus what do you want them to say.
1:45-2:30	Review Math Accessibility PDF and teachers pull out names from earlier reflection and select activities that would support those students on graphic organizer. (see video example)	Presentation: How to motivate students making math fun
2:30-3:00	Wrap up, reflection, evaluation.	Wrap up, reflection, evaluation

Table A2

Professional Development Timeline Day 3

Time	Day 3
8:30-9:00	Introductions new facilitators/teachers and share out from reflections or evaluation
9:00- 9:30	Reflection notebooks –think of some issues that a student brings to class (hungry, tired, mad,) and how it affects them
9:30- 10:00	
	Session 4: External Factors Parents (Video)
10:00- 10:45	Teachers share how they cultivate relationships with parents and support them.
10:45-11:00	Create a math night for parents, what would you share? Think of what bias you want to address from video.
11:00-11:30	15 Min Break
11:30-12:15	Session 5: External Factors Access (PDF) Teachers will read PDF and within teams discuss how to address the situations.
12:15-1:15	Teachers plan how to discuss these outside distractions with students / and what they could do to help them.
1:15-1:45	Lunch
1:45-2:30	Teachers play a game called Kahoot it will cover topics about the 3-day PD and end with a raffle.
	Work Time: Teachers work in collaborative groups to plan for their first math unit and applying skills learned over the 3-day PD.
2:30-3:00	Wrap up, reflection, evaluation

Day 1: Reaching All Learners

Goal 1: Demonstrate the process of creating lesson plans that incorporate specific strategies for a math lesson, taking into consideration the content, a student's ZPD level, and the learning environment.

8:30 – 9:00 Introductions and Icebreaker Activity

Individuals taking part in the event will be asked to complete name tags that contain their name, position, years of teaching experience, and an interesting tidbit about themselves. The presenter will share their name at the end and provide an overview of the professional development series, elaborating on the decision to select it as a research topic. Subsequently, the presenter will review the established norms and inquire if the participants have any additional contributions to make. Lastly, the presenter and administration team will distribute teacher reflection journals as a gesture of appreciation from the school to the participants.

Facilitator Notes:

1. Have name tags and markers available at each seat. Include various shapes in the corners of tents to help with groupings for discussions later.

2. Have participants share the four facts.

3. As teachers share their years of experience pass out colored stickers (0-3, 4-7, 8 and up). This will be used for later discussions to vary the experience per group.

4. Ensure each person shares and completes all components of the tent.

5. Materials –cardstock, markers, stickers

9:00 – 9:30 Morning Reflection

Participants are required to compose a reflective piece regarding their students who face difficulties in mathematics. They will be prompted to identify the specific students who struggle in their math class and enumerate potential factors contributing to their struggles. The objective is to humanize their concerns by associating them with real individuals, thereby imbuing their current efforts with a sense of purpose.

9:30 – 10:45 Session 1: ZPD Level

9:30 – 10:00 Activity 1:

As part of this exercise, participants will be requested to reflect upon their previous understanding of the zone of proximal development. They will be prompted to consider their personal interpretation of this concept, its significance in their role as educators, and the ways in which they manifest it within their classrooms. Moreover, they will be instructed to illustrate their thoughts through a drawing that encompasses all these elements, and they should be ready to present their artwork to the group.

Facilitator Notes:

1. Have teachers work with a partner on this task.

2. Play some instrumental music in the background.

3. Teacher will share speed-dating style where both rows rotate. Row 1 rotates to the right and row 2 rotates to the left.

4. Materials –white copy paper, markers, crayons,

5. Give 10 minutes to complete the activity and 5 minutes per each rotation

6. Question last 5 minutes: What were the similarities and differences in responses? Did anyone hear something unique?

10:00 – 10:45 Activity 2:

Participants will be required to read two articles and complete a comprehensive analysis. To ensure efficient distribution of work, the participants will collectively decide on the allocation of sections among their group members. Once assigned, each participant will independently read their designated section and identify significant points that they believe should be shared with the rest of the group. Subsequently, the participants will engage in group discussions, where they will exchange and consolidate the key points discovered within their respective small groups. Through this collaborative process, each small group will collectively determine a minimum of five key points that they all agree upon. These agreed-upon points will then be presented to the entire group. Finally, each table group will showcase the highlighted points from their team summaries.

Facilitator Notes:

1. Assign teachers chunked reading sections.
2. Follow the jigsaw protocol of sharing in small groups, then whole groups.
3. Have a scribe capture key information from each group on chart paper.

Materials: –chart paper, markers, copies of the articles

Article #1:

Mabry, B (2020). The one of proximal development (ZPD): The power of just right. Retrieved from https://www.nwea.org/blog/2020/the-zone-of-proximal-development-zpd-the-power-of-just-right/

Article #2:

Baker,J. (2023). How to Deploy Zone Proximal Development in Your Class: 4 Ways. Retrieved from http://splashlearn.com/zone-of-proximal-development-how-to-drive-your-students-maximum-potential

10:45 – 11:00 15-minute break

11:00 – 11:30 PowerPoint: Teaching with Students ZPD levels

The upcoming presentation will provide an explanation of the ZPD as defined by Vygotsky (1978), who first introduced this concept. Additionally, McLeod (2019) will be discussed for his contribution to the four levels of ZPD. The presentation aims to utilize the insights gained by teachers through their jigsaw article readings and address any remaining questions by emphasizing the three crucial components that teachers should prioritize.

Facilitator Notes:

1. When applicable refer to the information recorded on the charts from the jigsaw puzzle and connect it to the presentation.

2. Be sure to point of the parking lot for teachers to use as needed.

3. Materials –projector, laptop, power strip, and presentation

11:30 – 12:15 Activity 3: ZPD and Standards

Participants in the group will select an Algebra 1 standard that they have observed students struggling with in the past. They will proceed to engage in a discussion about the various strategies they have previously employed to assist students in mastering this standard. Collaboratively, they will determine whether a chosen strategy aligns with the struggling students' ZPD. This process will aid teachers in comprehending the effectiveness of the strategy and provide insights on potential improvements if it does not align with the ZPD of struggling students.

Facilitator Notes:

1. Assign new groupings.
2. Materials: index cards, char paper, markers, and copy or link to the Algebra 1 standards
3. Circulate to support teachers.
4. Ensure there is a mixture of experience at the tables during the planning portion.

12:15 – 1:15 Lunch

Facilitator Notes:

1. Check the parking lot and ensure all paper materials are passed out

1:15 – 2:30 Session 2 – Student Accessibility

1:15 – 1:45 Video:

Participants will have the opportunity to view a video that focuses on effective accessibility strategies aimed at assisting students who face challenges in accessing math content. Following this, they will engage in a roundtable discussion where they can share their reflections and thoughts based on the content of the video.

Resource: https://www.teachingchannel.org/videos/accessibility-strategies

Facilitator Notes:

1. Provide teachers 2 minutes to reflect on the video in their participant notebooks then share out within their small groups.

2. Pull from teachers whom you have not heard from to share out reflections in the whole group.

3. Materials –projector, laptop, power strip, and speakers

1:45 – 2:30 Activity 4:

A toolkit file containing accessibility strategies will be provided to the participants. This file will be filled with tasks that aim to address different math difficulties faced by students. During the morning reflection, participants will write down the name of a student and then identify the accessibility strategies that can be used to differentiate instruction for that student.

Resources :http://www2.edc.org/accessmath/resources/strategiesToolkit.pdf

Facilitator Notes:

1. Prepare a graphic organizer for teachers to record the strategies they plan to use.

2. Ensure there are enough accessibility files for each teacher.

3. Teachers may take a break as needed.

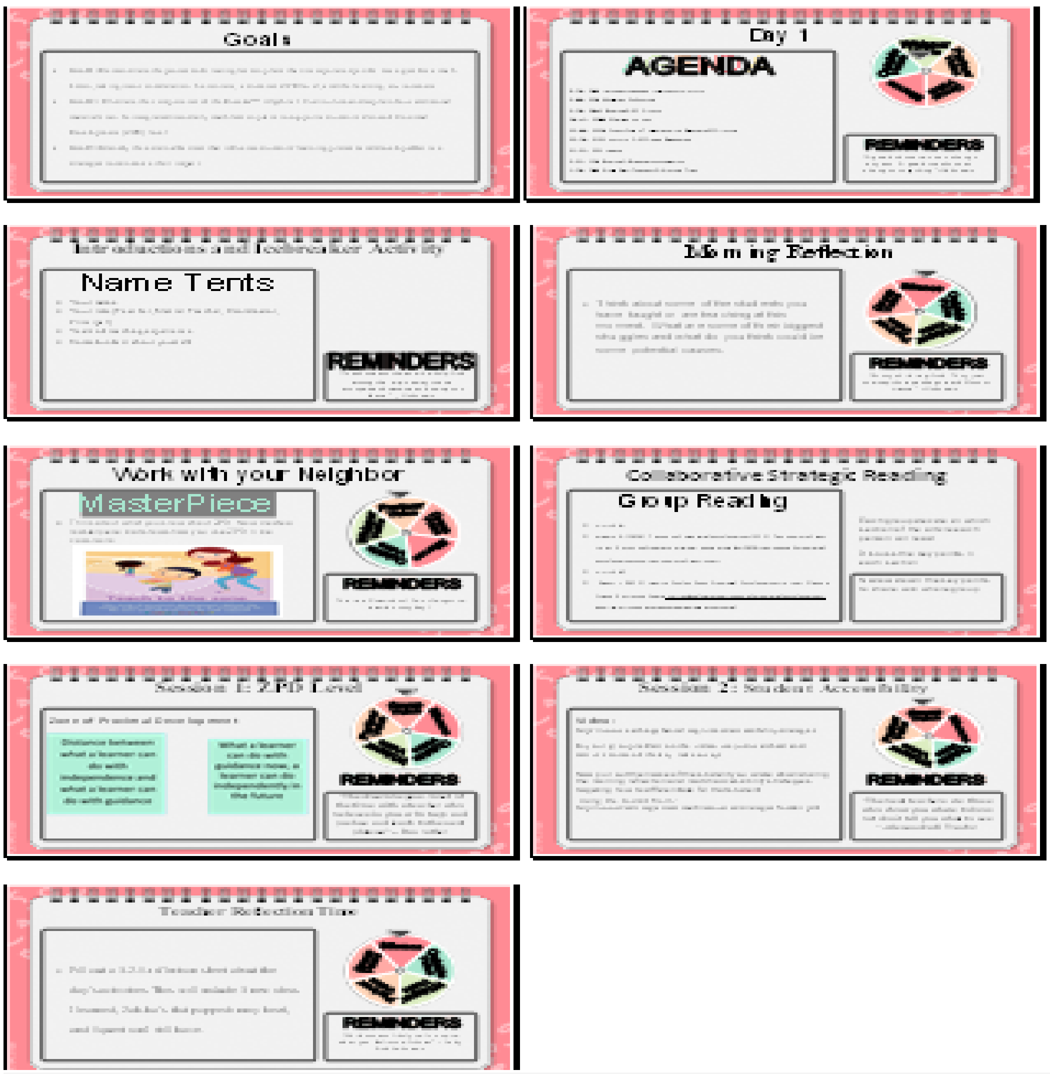
4. Materials –graphic organizer and accessibility handout

2:30 – 3:00 Close Out: Teacher Reflection Time

The participants will be asked to use an index card and give three fresh ideas they have acquired, two moments of sudden realization that have occurred to them, and one remaining question they still have that specifically relates to the day's activities.

Facilitator Notes:

1. Be sure to review the reflection sheets and address the questions participants still have the next day.
2. 2. Materials: –3-2-1 reflection sheets



Day 2 – Lesson planning with strategies

Goal 2: Illustrate the components of the Eureka Algebra 1 Curriculum and explain how additional materials can be integrated into daily math lesson plans to support a student's ZPD level.

8:30 – 9:00 Review Day 1 Reflections

The facilitator will address the questions from yesterday's session that the participants thought about or that remained in the parking lot items.

9:00 – 9:30 Morning Reflection

In this activity, participants will be tasked with writing a reflection on a lesson that was highly successful compared to one that was a complete failure. They will need to analyze and identify the key components that led to the success of the outstanding lesson, as well as list potential causes for the failure of the other lesson. The aim is to identify common elements present in successful lessons and unsuccessful ones. Following this, the facilitator will ask groups to share the commonalities found in their responses.

9:30 – 10:45 Session 1: Explicit Instruction

9:30 – 10:15 Video:

Throughout the session, all attendees will be invited to contemplate their understanding of explicit instruction, and a designated scribe will record their thoughts. Subsequently, a video will be presented that will comprehensively review the various components of explicit instruction. To aid comprehension, teachers will be provided with guided notes, and the facilitator will strategically pause at predetermined intervals to encourage interactive discussions.

Resource: http://www.teachertube.com/video/math-explicit-and-systematicinstruction-243125

Facilitator Notes:

1. Stop after each main section and engage teachers in reflections on items they might have included in their classrooms or any ah-ha's.

2. Allow teachers time to fill in the guided notes page that highlights key points.

3. Materials –guided notes page, projector, laptop, power strip, and speakers

10:15 – 10:45 Activity 1:

A challenge awaits the participants as they are invited to develop a captivating 30-second advertisement that effectively portrays their specific role in explicit instruction. The essential components to be showcased include daily reviews, the introduction of fresh content, guided practice, explicit feedback and correctives, independent practice, as well as weekly/monthly reviews. The leadership team will lend their expertise in selecting the group that excels the most, and the victorious team will be rewarded with a delightful treat. The more innovative and imaginative the ad, the better the chance of claiming the prize.

Facilitator Notes:

1. Split the group into 6 teams.

2. Be sure to explain the criteria for the ad. It must be 30 seconds and must contain elements from the video.

3. Pull teams out from a grab bag or hat.

4. Give teams 10 minutes to come up with commercial advertisement and practice.

5. After each team presents provide 2 minutes to discuss the main elements of the components.

6. Materials –grab bag, index cards, sweet treats

10:45 – 11:00 15-minute break

Facilitator Notes:

1. Set out sample explicit instruction lesson plans/templates.

2. Post domain interest sign-up sheet (i.e., number sense and operations, data analysis, etc.

11:00 – 12:15 Work Time:

During this allocated time, teachers collaborate in groups to effectively plan a lesson from the Eureka Algebra 1 Curriculum, utilizing explicit instruction and ZPD components.

Facilitator Notes:

1. Allow teachers to work in groups based on a combination of middle and high school teachers

2. Facilitate questions groups may have – (walking around getting involved in the groups)

12:15 – 1:15 Lunch Facilitator Notes:

1. Check the parking lot and ensure all paper materials are prepared

1:15 – 2:30 Session 2: Student Motivation

1:15 – 1:45 Activity 2:

Participants will commence by engaging in a journal reflection regarding the unfavorable remarks made by students about mathematics as well as the desirable positive comments they wish students would express or have already expressed. Subsequently, two fresh scribes will be selected to record the negative comments on sentence strips, which will be placed under a chart depicting a sad face, while the positive comments will be documented on sentence strips and positioned under a chart displaying a happy face.

Facilitator Notes:

1. Have two different colored sentence strips (one for negative and one for positive).

2. Discuss negative comments first then positives and brainstorm why students might have these feelings.

3. Materials –sentence strips, happy/sad face poster, markers

1:45 – 2:30 PowerPoint: Motivating Students

The presentation will cover the definition of student motivation, along with illustrations from a math classroom and a theoretical framework. Additionally, it will provide examples of enjoyable methods to involve students in math, which will ultimately enhance their motivation. Here are three tips with corresponding examples:

1. Emphasize the practicality of math: Encourage students to explore real-life applications such as calculating college expenses, understanding home buying costs, managing taxes, or designing a roller coaster.

2. Integrate technology:

The facilitator will direct teachers to visit http://nlvm.usu.edu/en/nav/vlibrary.html , where they can explore and practice with online manipulatives. This activity will help teachers connect technology usage to math engagement.

3. Infuse music into lessons: The facilitator will showcase YouTube clips of students rapping the quadratic equation. By incorporating music, teachers can make math lessons more engaging and memorable for students.

Facilitator Notes:

1. Have teachers take notes on engagement modeled by the facilitator

2. Lead a discussion on additional strategies teachers have tried that are not on the list.

3. Materials –projector, laptop, power strip, and presentation

2:30 – 3:00 Close Out: Teacher Reflection Time

The participants will be asked to use an index card and give three fresh ideas they have acquired, two moments of sudden realization that have occurred to them, and one remaining question they still have that specifically relates to the day's activities.

Facilitator Notes:

1. Be sure to review the reflection sheets and address the questions participants still have the next day.

2. Materials –3-2-1 reflection sheets

Day 3: Parent Involvement

Goal 3: Identify the external factors that influence students' learning processes and develop effective strategies to minimize their impact.

8:30 – 9:00 Review Day 1 Reflections

The facilitator will address the questions from yesterday’s session that the participants thought about or that remained in the parking lot items.

9:00 – 9:30 Morning Reflection

The task at hand for participants is to draft an unreserved reflection concerning the parents of their students and the manifold ways in which they perceive parents to impact their students. The aim is to ascertain the initial viewpoints of teachers regarding the parent-student relationship. Subsequently, they will exchange one piece of information or experience from their journal with their partner seated beside them.

9:30 – 10:45 Session 1: External Factors: Parental Support

9:30 – 10:00 Video:

At the outset, participants will engage in introspection regarding their methods of cultivating relationships with parents and providing them with assistance. Following this, two videos will be played, and teachers will be instructed to reflect on them in their participant notebooks. The first video will explore the importance of fostering positive relationships based on culture and behavior. Teachers will then be prompted to contemplate how they can adapt and implement these strategies in the context of teaching math. The second video will delve into parents' reactions to common core math, and teachers will be asked to brainstorm strategies for overcoming any negative views parents may have.

Resource: Video #1 https://www.youtube.com/watch?v=vbyhao0FtaQ

Video #2 http://www.cc.com/video-clips/nemi1a/the-colbert-reportcommon-core-confusion

Facilitator Notes:

1. Teachers can be pushed to share with the whole group.

2. Materials –projector, laptop, power strip, and speakers

10:00 – 10:45 Activity 1:

To create an enriching experience for their parents, participants will be divided into teams based on their respective schools. Working together, they will devise a detailed action plan for a math-focused evening. Their main aim will be to win over parents who hold similar opinions as those depicted in video #2, as well as tackle any other existing biases towards mathematics that they may encounter.

Facilitator Notes:

1. Split the group into teams based on the schools they teach at.

2. Confirm teachers have a detailed plan including things like activities and incentives for parents coming, incentives for students who show up, date based on the current school calendar.

3. Materials –school calendar

10:45 – 11:00 15-minute break

Facilitator Notes:

1. Ensure there are enough articles for each teacher for the next session.

11:00 – 12:15 Session 2: External Factors: Education and SES

11:00 – 11:45 Activity 1:

Following individual readings of the SES resource guide, participants will collaborate in table groups to generate solutions aimed at tackling these factors. The table groups will subsequently share their ideas, which will be documented on chart paper. The staff will then identify and prioritize the solutions that can be feasibly implemented to provide support to families throughout the ongoing school year.

Resource: http ://www.apa.org/pi/ses/resources/publications/factsheet-cyf.aspx

Facilitator Notes:

1. Switch up table teams to gain different perspectives.

2. Materials –SES resource guide, chart paper, markers, and stickers for votes

11:45 – 12:15 Activity 2:

Upon reviewing the resource guide, participants will take the opportunity to ponder and strategize a series of supplementary questions that they wish to pose during home visits. The purpose of these inquiries is to gain a more profound insight into the intricacies of family dynamics. Meanwhile, teachers will be tasked with creating personalized learning profiles for the students enrolled in their classes.

Facilitator Notes:

1. Have teams write their home visit questions on a master chart before leaving for lunch.

2. Be sure to have teams share out and explain why they selected the new questions and how they related to the reading.

3. Materials –chart paper and markers

12:15 – 1:15 Lunch

Facilitator Notes:

1. Check the parking lot and ensure all paper materials are prepared

1:15 – 1:45 Activity 3:

To enhance the learning experience during the professional development series, participants will engage in a Kahoot game. This interactive online question game encompasses all the topics covered throughout the series. The facilitator will initiate the game by clicking on the resource link and sharing the game pin code with the teachers. Teachers can easily join the game by accessing https://kahoot.it on their cell phones and entering the game pin code. To recognize achievement, prizes will be awarded to the top 3 winners among the teachers.

Resource: https://play.kahoot.it

Facilitator Notes:

1. Ensure all teachers have cell phone access to play the game.

2. Be sure to have prizes ready for the winners. Try to find gifts that correlate to one main topic from each day.

3. Materials –Kahoot game and teacher prizes

1:45 – 2:30 Work Time:

During the collaborative work session, participants will be given ample time to collectively devise and structure their inaugural mathematics unit, skillfully integrating the knowledge and abilities acquired throughout the extensive 3-day professional development series.

Facilitator Notes:

1. Prepare a graphic organizer for teachers to record the strategies they plan to use.

2. Ensure there are enough accessibility files for each teacher.

3. Materials –graphic organizer, extra accessibility handouts, math standards/units

2:30 – 3:00 Close Out: Teacher Reflection Time

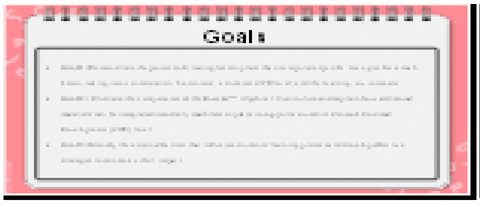
To gather feedback on the professional development series, participants will be asked to complete a summative survey on Survey Monkey. Moreover, they will be encouraged to show appreciation by filling out thank-you note cards for a fellow teammate who either aided throughout the three days or stimulated their thinking.

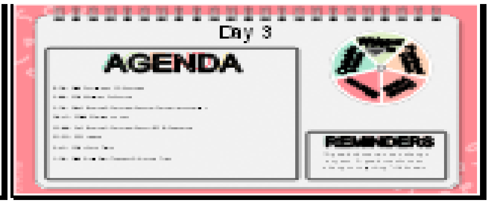
Facilitator Notes:

1. Be sure to thank the staff for their participation and leave your email for follow-up support or questions.

2. Provide premade thank you note cards printed on colored paper.

3. Materials –survey and note cards


Goals

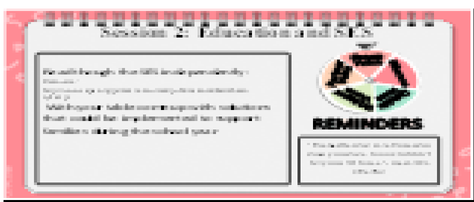

Day 3
AGENDA
REMINDERS

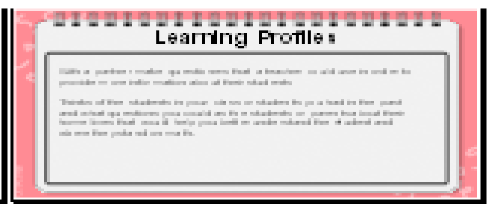

Review Day 2
Question & Answer
REMINDERS


Morning Reflection
REMINDERS


Video- Parent Support
Video Discussion
REMINDERS


Action time
Action Plan


Session 2: Education and SES
REMINDERS


Learning Profiles


Kahoot


Teacher Reflection Time
REMINDERS

Formative Professional Development Evaluation

Workshop: “Strategies to Improve Students Algebra 1 Academic Achievement”

Facilitator(s): ____

If you are not a teacher, what is your job title at your school? ____________________

Read each statement below and check the appropriate number indicating to what level you agree or disagree (4 Agree and 1 Disagree).

The professional development:

4 -Agree 3 -Somewhat Agree 2 -Somewhat Disagree 1 -Disagree

1. was of quality.
2. was relevant to my needs.
3. format and structure facilitated my learning.
4. enhanced my understanding of how to determine a student ZPD level in my classroom.
5. enhanced my understanding of how to use scaffolding in my classroom.
6. enhanced my understanding of how to motivate my math students.
7. enhanced my understanding of how to plan accessibility tools to enhance my math instruction.
8. enhanced my understanding of how to address external factors such as parental support and other issues facing students.
9. was the appropriate length.
10. should be recommended to other Algebra 1/Math teachers.

How will you use what you have learned?

Appendix B: Invitation

<u>About the study:</u>

- The purpose of this study is to explore the instructional strategies teachers use within a student's ZPD levels while using the Eureka Algebra 1 curriculum to support student achievement in Algebra.
- The interview should take about 45 to 60 minutes.
- Member checking: this is when the participants will review the analysis summary of their interview (no more than 10 minutes)
- Follow-up interview - this follow-up interview will only happen if or when further explanation of answers is needed (no more than 10 minutes)
- To protect the privacy of the participants, no names will be included in the study. Participants will be assigned code names.

<u>Volunteers must meet these requirements:</u>

- Have been teaching the Algebra 1 Eureka Curriculum for at least two years.
- Have a valid teaching certification in the field of high school mathematics.
- Teach the curriculum on a 20-week semester schedule.
- Have classes operating on a 90-minute block schedule.

This interview is part of the doctoral study for Honnalora Hill, an Ed.D. student at Walden University. Interviews will take place within 30 days of receiving your consent email or the consent form.

To confidentially volunteer, contact the researcher: Honnalora Hill

By Email: honnalora.hill@waldenu.edu

By Phone: 504-655-3633 or

By Direct message here on Facebook

Appendix C: Consent Form

CONSENT FORM

Consent Form for Minimal-risk, Work-related Interview

You are invited to take part in an interview for a research study that I am conducting as part of my doctoral program.

Interview Procedures :

If you agree to be part of this study, I will be asking you interview questions about your professional work and audio-recording your responses. Opportunities for clarifying statements will be available after I analyze the interviews (via a process called member checking).

Voluntary Nature of the Study:

This study is voluntary. If you decide to join the study now, you can still change your mind later.

Risks and Benefits of Being in the Study:

Being in this study would not pose any risks beyond those of typical daily life. This study's aim is to provide data and insights that could be valuable to those in professional roles related to yours. Once the analysis is complete, the researcher will share the overall results by publishing the final study on the Scholarworks website.

Privacy:

I am required by my university to protect the identities of interviewees and their organizations. I am only allowed to share interviewee identities or contact information as needed with Walden University supervisors (who are also required to protect your privacy). Any reports, presentations, or publications related to this study will share general patterns from the data without sharing the identities of individual interviewees or their organizations. If I were to share this dataset with another researcher in the future, the dataset would contain no identifiers, so this would not involve another round of obtaining informed consent. Data will be kept secure by password protection. The interview transcripts will be kept for at least 5 years, as required by my university. The collected information will not be used for any purpose outside of this study.

Contacts and Questions:

If you want to talk privately about your rights as a participant, you can call Walden University's Research Participant Advocate at 612-312-1210. Walden University's ethics approval number for this study is 04-14-23-0363622.

Please share any questions or concerns you might have at this time. If you agree to be interviewed as described above, please say "yes" for the audio-recording when I ask, "Do you agree to be interviewed for this study?

Appendix D: Interview Protocol

Name of Interviewee:
Date:
Start Time of the Interview: End time of the interview:
Introduction to Interview: Context

1. **Appreciation & Introduction**

Thank you very much for being available to share your insights and experiences. I am very grateful that you are willing to talk with me about your experiences as an Algebra I teacher who uses the Eureka Curriculum. I have planned approximately 45-60 minutes for this interview. Are you still okay with me audio-recording our interview?

2. **Questions**

Do you have any questions before we begin? If you have questions at any time, please let me know.

Interview Guide

1. Tell me about your experiences using the Eureka Curriculum.

2. I am not sure if you are familiar with the concept of Zone of Proximal Development, or ZPD. As teachers, we meet the students where they are and teach new skills at their level of understanding as we guide them to mastery of the new skill. Kind of like how Goldilocks checked things until she found the ones that were "Just Right". Teachers use ZPD strategies to find the "just right' for every student. As you use the Eureka Curriculum, how do you determine where every student is with the concepts you must teach?

3. How do you determine what level your students are at?

4. How do you enrich lessons that are too easy?

5. How do you scaffold difficult tasks? How do you break tasks down into manageable chunks for your students?

6. How do you know if students understand the skills or concepts being taught?

7. Can you tell me about specific strategies you use when teaching a new Algebra 1 skill and how you use those strategies during the lesson?

8. Which strategies do you find have had the greatest impact on student achievement?

9. How do you know that a strategy has had an impact on a student's achievement?

Closing

1. Is there anything you feel you want to share more about that I did not give you a chance to explain or clarify?
2. Is there anything else you want to tell me about any of the questions I have asked?
3. Do you have any questions for me ?