# ACCESSING GRADE-LEVEL MATHEMATICS CURRICULUM FOR TIER-THREE-HEAVY URBAN CLASSROOMS

by

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*To my father who inspired my love for learning.*

*To my mother who nurtured my passion for children.*

*To my husband and son for giving me unconditional love, patience, and support.*

*I am grateful to God for guiding my heart and spirit.*

*This journey would not have been possible without each of you.*

*Thank you.*

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Cassandra Marie Chui Moore

# ABSTRACT

ACCESSING GRADE-LEVEL MATHEMATICS CURRICULUM FOR TIER-THREE-HEAVY URBAN CLASSROOMS

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This dissertation explores the instructional strategies that elementary mathematics teachers employ to support large groups of students who function two or more grade levels below in tier-three-heavy urban classrooms. With a focus on teacher efficacy, teacher agency, and attribution theory, this study investigates how educators navigate the challenges of optimizing grade-level mathematics curriculum for students who struggle to meet proficiency benchmarks. Utilizing a comparative case study approach, classroom observations and semi-structured interviews were conducted with teachers in both tier-one-heavy and tier-three-heavy classrooms. The findings highlight the instructional scaffolding, differentiated teaching methods, and motivational strategies that teachers implement to bridge academic gaps while managing resource limitations and time constraints. This research contributes to the discourse on equitable mathematics education by providing insights into the realities of teaching in urban public schools and advocating for more effective interventions to enhance student achievement.

TABLE OF CONTENTS

TABLE OF CONTENTS—Continued

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE

INTRODUCTION

## Overview

Today, having a multi-tiered system (MTSS) in the classroom is something that many educators rely on to support the needs of their students individually. This tiered system is defined by the American Institutes for Research (2024) as “a proactive and preventative framework that integrates data and instruction to maximize student achievement and support students social, emotional, and behavior needs from a strengths-based perspective (para. 1).” Originally this system was called response to intervention (RTI). RTI was often used as an alternative way to identify students with specific learning disabilities in the Individuals with Disabilities Education Improvement Act (IDEA) 2004 reauthorization. Later on, it was used to create a tiered system to support students to improve their academic learning (Fuchs & Fuchs, 2017). In urban public schools, there are three tiers in this system for identifying the supports a student should need. It is based on their functioning level which is determined by diagnostic testing. Tier-one is a student who is functioning on or above grade level. Tier-two is a student who is functioning one grade level below. Tier-three, being the most severe, which is a student who is functioning two or more grade levels below.

A common mathematics classroom population is usually tier-one-heavy. In tier-one–heavy classrooms, most students are tier-one, followed by a smaller number of tier two students, and an even smaller number of tier-three students. Teachers in tier-one-heavy classrooms plan to support a small group of students in their class with tier-three instructional support. They can teach whole group grade-level content and provide small group instruction to the students who are still struggling. In urban public schools, there are many tier-three-heavy classrooms. Here there are large numbers of students who struggle with reaching grade-level proficiency. Witzel and Riccomini (2007) state that large numbers of U.S. students still achieve scores below the minimum proficiency level in mathematics. The 2003 NAEP reports that 23% of fourth-grade students and 32% of eighth-grade students scored below the minimum proficiency level. It is evident that there is a requirement to create more streamlined and successful teaching methods, educational plans, and learning resources for students who struggle in mathematics, both with and without disabilities.

There are many teachers in urban public-school districts whose tier-three students are more than half of their total classroom population. Students struggle with grade-level content which makes whole group instruction difficult to complete at a pace that allows the teacher to cover all necessary content for the year. This discussion is an exploration of teacher efficacy, teacher agency, and attribution theories and how they connect to supporting classrooms that consist of majority tier-three students and how equipped teachers may be to support large groups of struggling students.

In urban public-school districts, students are given a diagnostic assessment to see what grade level they are currently on in mathematics. The district uses these data to plan intervention for students that are struggling, with the hope that they will come close to or meet proficiency in the future. When most of a class is functioning at two or more grade-levels below in mathematics, teachers find themselves planning for already anticipated misconceptions that students will have when being introduced to new grade-level content.

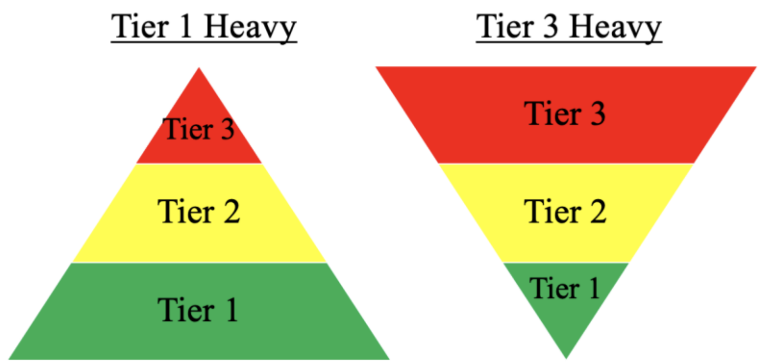
Teachers already plan to support most of their class with scaffolds, manipulatives, modeling, guided practice, providing opportunities for student discourse, independent practice, and small group instruction all in a finite amount of time. This brings me to my research questions:

1. How do teachers optimize grade-level mathematics curriculum for large groups of students who function at two or more grade-levels below?
2. What strategies do teachers utilize to address large numbers of tier-three students?

Most research discusses ways that teachers can support a class that is *tier-one-heavy* - large sized tier-one group of students, a medium sized tier two group of students, and a small sized group of tier-three students. The reality of teachers in large urban public-school districts is that most classrooms look the opposite. See in *Figure 1* where teachers experience what I consider a *tier-three-heavy* classroom - a large sized tier-three group of students, a medium sized tier two group of students and a small sized group of tier-one students. Teachers with tier-three-heavy student classes must plan for a whole group support with grade level content rather than a small group of students that may need additional support.

Figure 1.

Tier-one-Heavy Classroom vs. Tier-three-Heavy Classroom




*Note:* On the left is a tier-one-heavy classroom and on the right is a tier-three-heavy classroom.

Research does not cover how teachers with tier-three-heavy classes should plan to effectively support their students with grade level mathematics content while being given the same amount of resources and time as a class would that is tier-one-heavy. It is evident that there is a necessity to create more streamlined and impactful instructional methods, curricula, and materials for students with and without disabilities who struggle in mathematics.

## Theoretical Framework

The theoretical framework used in this dissertation are teacher efficacy, teacher agency, and attribution theory collectively. The concept of self-efficacy traces its origins to Bandura, who established a connection between self-efficacy and behavioral change. Bandura (1977) noted that cognitive processes play a significant role in acquiring and retaining new behavior patterns. This relationship becomes evident in the realm of motivation, which involves the activation and persistence of behavior and is influenced by cognitive factors. To increase student achievement, teachers formulate goals and expectations and strategize to achieve them. Bandura pointed out that by linking self-rewarding reactions to the attainment of specific behavioral standards, individuals create incentives to persist until their performances align with self-set expectations.

Bandura (1977) referred to these standards as *efficacy expectations*, defined as the belief in one's ability to successfully execute necessary behaviors to yield desired outcomes. This perceived self-efficacy also affects the choice of behavioral situations in early stages. The construct of self-efficacy encompasses four distinct analytical components: performance accomplishments, vicarious experiences, verbal persuasion, and emotional arousal. Successes lead to heightened mastery expectations, while repeated failures diminish them. Observing others perform daunting tasks without adverse consequences can cultivate expectations that intensified and sustained efforts will lead to personal improvement. Verbal persuasion, Bandura (1977) explained, can induce individuals to believe in their capacity to manage challenges that have previously overwhelmed them. Additionally, emotional arousal triggered by stressful situations can provide insights into personal competence under specific circumstances. Bandura's framework establishes the importance of the role of self-efficacy in behavior change, motivation, and the correlation of cognitive processes.

Bandura's (1982) research emphasized the significance of self-efficacy as a fundamental mechanism in human agency. In the context of teacher agency, self-efficacy beliefs play a crucial role in empowering educators to exercise control over their teaching practices and positively influence student learning outcomes. Bandura advocates that self-efficacy involves combining cognitive, social, and behavioral abilities to create cohesive sequences of action aimed at achieving various objectives.

Furthermore, Bandura's (1982) exploration of self-precepts highlights the role of individuals' perceptions of their operational abilities as immediate influencers in shaping behavior, thinking tendencies, and emotional responses when confronted with challenging scenarios. In the realm of teaching, these self-precepts are directly linked to teacher agency, as teachers who possess high self-efficacy are more likely to exhibit proactive behaviors, innovative thinking, and emotional resilience in the face of instructional challenges.

Bandura's research serves as a foundation for understanding how self-efficacy beliefs, rooted in cognitive, social, and behavioral factors, intersect with teacher agency. Educators who cultivate and strengthen their self-efficacy are better equipped to exercise agency in their classrooms, making informed decisions, implementing effective teaching strategies, and ultimately enhancing the quality of education they provide to their students. This connection brings light to the need of self-efficacy when fostering teacher agency and its potential implications for supporting the outcomes of tier-three students.

Bandura's research sheds light on the profound connection between self-efficacy and teacher agency, emphasizing the critical role of accurate self-appraisals in the realm of education. When educators misjudge their own personal efficacy, it can lead to undesired consequences in the classroom. For instance, teachers who underestimate their abilities may shy away from taking initiative or implementing innovative teaching methods, potentially hindering their agency to positively impact student learning. On the other hand, an accurate appraisal of one's teaching efficacy can have a transformative effect on an educator's functional worth, bolstering their confidence and competence in shaping effective teaching practices.

The significance of this connection becomes apparent when considering how educators cultivate an attraction towards teaching activities for which they initially lack proficiency, enthusiasm, and confidence (Bandura, 1982). In the context of teacher agency, the ability to proactively engage with and adapt to new teaching challenges and innovations is vital. Teachers who nurture their self-efficacy are more likely to embrace these challenges, harnessing their agency to continuously improve their teaching practices and enhance student outcomes.

Furthermore, Bandura's insights into positive incentives and external rewards carry significant implications for teacher agency. While positive incentives are commonly used to stimulate interest and motivation in educators, Bandura raises concerns that solely rewarding teachers for their actions can paradoxically reduce their intrinsic motivation and, consequently, their agency in the classroom. When educators shift from internal motivators to external rewards, the significance and personal meaning associated with their teaching actions may diminish, potentially limiting their agency.

Teachers who support large groups of tier-three students encounter many failures, but they also encounter many successes. Working with students that need additional scaffolding and differentiation to gain access to grade level curriculum is difficult work and is not always successful. Why do teachers that support struggling students continue to set goals of growth and expectations for their students at grade level, when they know that their students are too far below to show mastery? What keeps teachers motivated to keep trying new strategies?

## Proximal Self-Motivation

Motivation presents itself in research under three categories: intrinsic, altruistic, and extrinsic motives (Brookhart & Freeman, 1992). Intrinsic motivations satisfy a deep personal desire of those entering the field, while altruistic motives are centered on the wish to help others and create a lasting impact in students' lives. On the other hand, extrinsic motivations emphasize external benefits of the profession, such as salary or vacation time (Lin et al., 2012; Watt et al., 2012). Overall, research has concluded that on the spectrum of motivations—from intrinsic to extrinsic—most teachers' reasons for entering the field are closer to intrinsic motivators than extrinsic ones (Bilim, 2014; Lin et al., 2012; Watt et al., 2012). Intrinsic motivation seems to be the most sustainable motive for teachers. Chiong et al. (2017) reported that intrinsic and altruistic motivations have the greatest influence on teachers entering the field. Intrinsic motivation is the most connected to teachers that work with tier-three students. This may be because teachers are constantly working on growth goals for their students.

The perception of teachers' effectiveness has been associated with student outcomes, particularly academic performance. Research conducted by Tschannen-Moran and Hoy (2001) showed that this connection between teacher efficacy and student achievement underscores the significance of teachers' perceived competence in their professional roles. Furthermore, the level of effectiveness a teacher believes they possess plays a crucial role in shaping their commitment to teaching, the goals they set, and their overall level of ambition in the educational context. Teachers who exhibit a strong sense of efficacy tend to exhibit greater levels of preparedness and adopt a more organized and structured approach to their teaching practices. This research underscores the importance of nurturing teacher efficacy as a means of enhancing educational outcomes.

Connecting proximal self-motivation back to teachers who support tier-three students, acknowledging the limitations of working with such a vulnerable group of students is understood by educators. There seems to be a deep understanding of where these students are coming from and where they are trying to go, also considering how much work it will take to get there. It is ideal that teachers who support large groups of tier-three students in their classroom set clear and meaningful goals, but most importantly, they set goals that are attainable for themselves and their students.

**Efficacy Beliefs**

Efficacy beliefs, often referred to as self-efficacy beliefs, are a central construct in understanding an individual's perception of their abilities and their capacity to exercise control over their actions and outcomes (Bandura, 1997). These beliefs are multilayered and can be assessed across various dimensions and factors, providing insights into how individuals evaluate and appraise their capabilities in diverse contexts. Some of the key dimensions and factors that contribute to the assessment of self-efficacy beliefs include:

1. *Level*: This dimension encompasses the overall level of self-efficacy that an individual holds within a specific domain or task. It reflects the degree of confidence and competence an individual feels regarding their ability to perform a particular activity effectively.
2. *Generality*: Generality pertains to the extent to which self-efficacy beliefs are generalized across different situations or tasks. Some individuals may exhibit high

self-efficacy in specific contexts, while others possess a broader belief in their abilities, extending across a wide range of situations and challenges.

3. *Strength*: The strength of self-efficacy beliefs signifies the intensity of an individual's conviction in their capability. Strong self-efficacy beliefs indicate a high level of confidence and resilience, while weak self-efficacy beliefs suggest lower confidence and a greater susceptibility to self-doubt.
4. *Specificity*: Specificity relates to the degree to which self-efficacy beliefs are task- or activity-specific. While some individuals may hold highly specific self-efficacy beliefs for distinct tasks, others may maintain more generalized beliefs that encompass a variety of activities and responsibilities.
5. *Task Difficulty*: Self-efficacy beliefs can be influenced by an individual's perception of the difficulty of a task. People may exhibit varying levels of self-efficacy for tasks they perceive as easy versus those they view as challenging or daunting.
6. *Past Experiences*: Past successes and failures significantly shape self-efficacy beliefs. Positive experiences tend to boost self-efficacy, reinforcing an individual's confidence, while failures may erode self-efficacy, leading to diminished belief in their abilities.
7. *Social Persuasion*: The influence of others' opinions and feedback can exert a substantial impact on an individual's self-efficacy. Encouragement and positive feedback from peers, mentors, or role models can enhance an individual's self-efficacy beliefs, providing external validation and support.

8. *Physiological and Emotional States*: An individual's physical and emotional state at a given moment can affect their self-efficacy. For instance, feelings of anxiety or fatigue may temporarily lower self-efficacy, while a positive emotional state can bolster one's confidence in their capabilities.
9. *Cultural and Societal Factors*: Cultural and societal norms, values, and expectations play a significant role in shaping self-efficacy beliefs. Different cultural contexts may emphasize specific beliefs or behaviors, influencing self-efficacy in distinct ways.
10. *Self-Regulatory Mechanisms*: Individuals may employ various self-regulatory mechanisms, such as setting goals, monitoring their progress, and providing self-feedback. These mechanisms can impact self-efficacy by fostering a sense of control and mastery over one's actions and outcomes.

Measuring self-efficacy often involves the use of surveys, interviews, or other research methods that assess these dimensions comprehensively, enabling researchers and practitioners to gain a nuanced understanding of an individual's beliefs about their capabilities in a wide array of situations and contexts (Bandura, 1997). This multilayered approach to studying self-efficacy beliefs is essential for addressing the complex interplay between an individual's perceptions of their abilities and their capacity to exercise agency effectively in diverse personal and professional settings.

In accordance with Tschannen-Moran et al. (1998), it is imperative to distinguish between the concept of perceived self-efficacy, which pertains to one's belief in their capacity to carry out particular actions, and the concept of locus of control, which relates to beliefs about the influence of those actions on outcomes. This differentiation is significant in understanding how teachers can effectively support tier-three students. In this context, it underscores the importance of both teachers' personal beliefs in their ability to make a difference in their students' lives and their access to valuable educational resources. This interplay between teachers' self-efficacy and their available resources plays a pivotal role in shaping the support provided to tier-three students and ultimately impacting their educational outcomes.

In a study conducted by Voica and colleagues (2020), it was observed that the positive effects of strong efficacy beliefs extended to prospective mathematics teachers. The research revealed that these high efficacy beliefs served as a motivating factor, encouraging these individuals to persist in problem-solving tasks. This finding underscores the role of self-efficacy in fostering determination and resilience in prospective mathematics educators.

A notable connection has been established between mathematics anxiety and mathematics teaching efficacy among prospective elementary teachers. Several studies (Bekdemir, 2010; Gresham, 2010; Swars et al., 2006) have explored this relationship, consistently revealing that prospective teachers with elevated levels of teaching efficacy tend to exhibit lower levels of mathematics anxiety. This correlation suggests that a strong belief in their ability to teach mathematics effectively may contribute to a reduction in anxiety related to the subject, potentially facilitating more positive learning experiences for both teachers and students.

## Attribution Theory

Attribution theory, as proposed by Weiner (1985), is a psychological framework that delves into the intricate process of how individuals attribute causes to events and outcomes, consequently shaping their emotional experiences and goal anticipations. As Weiner noted, causal stability is a fundamental factor in this theory, with the potential to influence changes in individuals' expectations and perceptions of their goals. This theory identifies three crucial causal dimensions that play a pivotal role in determining emotional responses, including anger, gratitude, guilt, hopelessness, pity, pride, and shame. The three dimensions are as follows:

1. Locus of Causality
2. Controllability
3. Stability

These dimensions shed light on how people assign responsibility for their successes and failures, impacting not only their emotional states but also their subsequent actions and behaviors. In essence, attribution theory offers a comprehensive lens through which we can understand the complex interplay between causality, emotions, and goal-oriented behaviors in various aspects of human life.

Fisk and Taylor (1999) discussed attribution theory as it focuses on the cognitive processes involved in how individuals, as social perceivers, utilize information to formulate causal explanations for various events. They shared that this theory delves into two key aspects: the nature of the information collected and the manner in which it is integrated to shape causal judgments. Essentially, attribution theory provides a valuable framework for understanding how people make sense of the world around them by attributing causes to outcomes and events, emphasizing the cognitive processes that underlie these judgments . This perspective is important in understanding how individuals interpret and assign reasons for both their own actions and the actions of others.

**Locus of Causality**

Locus of causality, a fundamental concept in attribution theory, was first systematically explored by Fritz Heider in 1958, earning him recognition as the originator of the attributional approach in psychology. It's important to remember that "locus" and "control" are different things. But when we say "locus of control," it can be confusing because it sounds like just one thing. To make it clearer, Weiner (1985) says we should call it "locus of causality" instead. This helps people understand it better and keeps the three parts of the idea clear.

Heider's (1958) work has played a foundational role in shaping contemporary attribution theory. Specifically, his contributions emphasized the distinction between dispositional attributions, which involve attributing the cause of an event or behavior to internal, inherent factors within an individual, and situational attributions, which ascribe the cause to external or environmental factors. Heider's emphasis on this dispositional versus situational dimension marked a significant turning point in our understanding of how individuals perceive and explain the causes of events and behaviors. This distinction has since formed the basis for numerous studies and theories within the field of attribution theory, providing valuable insights into the complexities of human judgment and social perception (Weiner, 1985).

Julian Rotter added to the internal-external distinction of attribution theory in 1966. Rotter's innovative framework, categorized individuals into two distinct groups—

internals and externals—became a focal point for extensive research within the field. His classification system, based on an individual's perceived locus of control, introduced a valuable lens through which psychologists could analyze and understand human behavior and decision-making processes. The differentiation between internals, who attribute outcomes primarily to their own actions and choices, and externals, who tend to ascribe results to external factors or luck, laid the foundation for exploring the diverse psychological factors that underlie individuals' perceptions of control over their lives (Rotter, 1966).

Graham (1991) discussed the relationship between pride and self-esteem and its connection to an individual's locus of causality. Graham wrote that pride typically arises when individuals experience success and attribute it to their own aptitudes, diligent efforts, or other personal characteristics. In the classroom, this can be particularly relevant when teachers are working with large groups of tier-three students. When students show growth, the teacher can feel a sense of pride and boost of self-esteem. Conversely, Graham's observation also showed the importance of avoiding the attribution of failure to these internal factors, as doing so can lead to negative self-esteem for the teacher when their efforts with students is deemed unsuccessful in assessment data.

**External Locus of Control**

The concept of an external locus of control presents a distinct perspective on individual behavior and its consequences. Kiral (2019) mentioned that individuals characterized by an external locus of control exhibit a particular set of traits and experiences. First, these individuals tend to be less open to innovation, as they often perceive external factors as dominant in determining the course of their lives. This inclination can hinder their willingness to explore new ideas, take risks, or adapt to changing circumstances, as they may feel their efforts are less likely to yield meaningful outcomes.

Also, individuals with an external locus of control often resist taking responsibility for their actions and decisions, as they believe external forces largely dictate their fates. This aversion to responsibility can lead to reduced motivation and lower levels of success in various domains, in this case, professional educator development. The perception of limited control over one's life can result in diminished ambition and a sense of powerlessness.

In addition, Kiral (2019), mentioned that an external locus of control is associated with leading a more stressful life and experiencing frequent disappointments. These individuals may experience elevated stress levels, given their perception that they have little influence over the outcomes of events. This chronic stress can have adverse effects on both mental and physical health. Thus, a consistent sense of disappointment may stem from the belief that external factors continuously thwart their efforts, which can lead to a negative cycle of diminished motivation and self-esteem. An external locus of control is linked to a reluctance to embrace innovation, a resistance to assume responsibility, low motivation, and reduced success. It also brings about a heightened experience of stress and recurrent disappointments, reflecting the significant impact that one's perceived locus of control can have on various aspects of their life.

Teachers with an external locus of control, are not the best fit when working with large numbers of tier-three students. Trial and error is a large part of their educational process and this does not mesh well with someone who is externally motivated.

Innovation is at the core of supporting students that need additional support accessing grade level content and an educator that is resistant to this reality will suffer emotionally within their work. On the contrary, educators with an internal locus of control flourish in this sort of environment.

**Internal Locus of Control**

The concept of an internal locus of control plays a pivotal role in understanding individual motivation, success, and a range of personality traits and behaviors. As Kiral (2019) notes, individuals who possess an internal locus of control tend to exhibit several distinct characteristics. First, they tend to be highly motivated individuals, as they believe that their actions and efforts directly influence the outcomes they achieve. This internal belief in personal agency can propel them to set and pursue ambitious goals, contributing to their success in various endeavors, including academic and professional domains. Additionally, individuals with an internal locus of control often display entrepreneurial qualities, as they are more likely to take calculated risks and seize opportunities, confident in their ability to shape outcomes. Their conciliatory and socially responsible nature reflects their tendency to take responsibility for their actions, fostering positive interpersonal relationships and a sense of accountability in both personal and professional settings.

Thus, the presence of an internal locus of control is closely related to self-esteem and emotional stability. Kiral (2019) wrote that individuals who believe that they have control over their destinies are more likely to experience a sense of self-worth and confidence, which can contribute to higher self-esteem. This belief in personal agency tends to buffer against emotional instability, as individuals with an internal locus of control are better equipped to cope with adversity and setbacks, viewing them as challenges they can overcome rather than impossible obstacles. In sum, an internal locus of control not only shapes individual motivation and success but also influences entrepreneurial spirit, interpersonal dynamics, self-esteem, and emotional well-being, contributing to a well-rounded and resilient individual.

Internal locus of control and its connection to teachers that are working with large groups of tier-three students is necessary. Tier-three students may not learn everything on the first try, especially when learning grade level content. The teacher is constantly looking for new and innovative ways for tier-three students to retain grade level content. When unsuccessful results come back to the teacher, there is a sense of failure and diminished self-esteem. On the other hand, when successful results are achieved, a sense of pride comes into play for the educator. This internal boost could help teachers continue to work with tier-three students on skills that they are lacking, especially when failure can be quite common among this population.

**Controllability**

Locus of control allows for the differentiation of causes based on their internal or external nature and whether they are perceived as controllable or uncontrollable. For instance, a cause can be internal, such as an individual's math aptitude, yet uncontrollable, as in the case of an innate skill. If a student attributes their failure in mathematics to poor aptitude, they perceive their performance as primarily determined by their inherent skill and ability (Weiner, 1985).

Additionally, the emotional response to personal failure is influenced by whether the causes are perceived as controllable or uncontrollable. As Graham (1991) highlights, feelings of guilt often arise when individuals attribute their failures to factors that were within their control. This emotional reaction emphasizes the significance of the control dimension in the attribution process, as it not only affects how individuals perceive the causes of their actions but also shapes their emotional experiences in response to success or failure.

Controllability impacts the educational process for tier-three students greatly. Teachers with tier-three-heavy classrooms have the same, if not less resources than teachers who service tier I heavy classrooms. They are provided with the same amount of instructional time and the same Common Core State Standards even though tier-three students are at a clear disadvantage of meeting these standards. Teachers with tier-three-heavy classrooms, do not have control over time and resource constraints, but they do have control over their instructional optimization and delivery so that students can receive access to grade level content in an efficient manner. This optimization would include scaffolding - a system or framework of support provided by an instructor to help a student reach the next level of learning (Mariam-Webster, 2023). Also, intervention - the application of professional skills to maintain or improve a child's potential for ongoing healthy development (Howard & Taylor 1994).

**Stability**

Within the framework of attribution theory, the stability dimension plays a crucial role in understanding how individuals attribute causes to various events and outcomes. As Weiner (1985) points out, this dimension acknowledges that certain factors, such as mood, fatigue, or temporary effort, are classified as internal and unstable causes. Essentially, these causes are transient and subject to change over time. For instance, if the teacher or the student experiences a momentary mood disturbance or fatigue, these internal and unstable causes may lead to a temporary decline in performance but are not indicative of a long-term trend.

Conversely, stable causes are associated with more enduring and consistent outcomes. Graham (1991) highlights that stable causes for failure can evoke feelings of hopelessness, apathy, or resignation. These emotions are tied to the belief that one's prospects are unlikely to improve in the future, as the underlying cause of failure remains relatively constant. Therefore, within the stability dimension of attribution theory, individuals assess whether the causes of events or behaviors are likely to persist or change over time. This evaluation of stability versus instability significantly influences how individuals interpret their own and others' actions, ultimately shaping their emotional responses and future expectations.

Overall, the stability dimension plays a large role in the anticipated results of teacher plans to support tier-three students. Changes in the culture and climate of the educational environment can impact the ability of teachers to provide meaningful instruction, and for students to receive that instruction. Changes in mood or a rise in fatigue could affect student achievement outcomes and may or may not be indicative of the teacher’s ability to provide high-quality instruction.

The purpose of this chapter was intended to explore teacher efficacy, teacher agency, and attribution theories and how they connect to supporting classrooms that consist of majority tier-three students and how equipped teachers may be to support large groups of struggling students. Teacher efficacy and agency impact the motivation of the educator and, ultimately, the student. Teachers set goals with the intention of meeting expectations. When expectations are met, self-perceived efficacy rises, and when they are not, it decreases. Bandura's research laid the groundwork of efficacy beliefs and their relationship to one's self-efficacy and performance while others have found its connection to the educational field. Teacher efficacy ties right into attribution theory where a teacher's locus of control can impact their ability to provide access to grade level content for tier-three students. External factors such as lack of controllability, and stability can negatively influence the internal control of the teacher and the student. It was determined that an internal locus of control is the best method for an educator to maintain motivation in order to see success in student achievement in the long term. With consideration to all dimensions of teacher efficacy, teacher agency, and attribution theory, educators can support large groups of tier-three students, not only efficiently, but sustainably over time.

CHAPTER TWO

LITERATURE REVIEW

## Overview

This chapter provides a comprehensive review of existing literature related to mathematics interventions for elementary students, particularly those classified as "at-risk" and performing below grade level. The research focuses on students who are struggling with mathematics but are not classified as having learning disabilities. This review is organized around three key themes: optimizing grade-level mathematics curriculum, instructional scaffolding, and mathematics intervention, with an emphasis on how these approaches can be tailored to support tier-three students. Through a detailed exploration of these themes, the chapter delves into effective teaching strategies and interventions, highlighting the importance of scaffolding, culturally relevant instruction, and intensive intervention programs to bridge the gap between students' current performance and grade-level expectations. The review also addresses the social and emotional contexts that influence students' learning, offering insights into how educators can provide equitable access to mathematical education for all students.

## Search Terms

I began exploring the literature by searching the ERIC database for peer-reviewed journal articles containing both the phrases “at risk” and “mathematics intervention.” My search yielded 49 results. I narrowed my search to the education level of elementary school and published dates from 2011 through 2021. This yielded 30 results. I selected three articles that fit the purpose of this paper. I did not use the remaining searches because they were either not empirical articles or they were not speaking to elementary students. I used the reference lists for the three articles that I retrieved to find two more relevant articles. I searched the following terms i n the JSTOR database "mathematics instruction," "at risk," "minority," and "elementary," and yielded 250 results. I selected two journal articles that aligned to my topic and used their references to find two more articles for a total of four additional articles.

Next, I searched in the JSTOR database for journal articles published from 2011 through 2021 and containing both the phrases "mathematics instruction" and "students below grade level." My search yielded 22 results and I selected three of these articles. The others were not included in the review because the main topics of the article were not relevant or the research did not relate to elementary students. Thus, the research on the topic is quite narrow and limited, especially when discussing a classroom that is mostly composed of students who are more than two grade levels below but are not identified as learning disabled (LD).

I developed themes from my reading that I deemed most important. Due to limited research on my topic, I needed to return to conduct a more advanced search. I resumed my search for "mathematics scaffolds" and yielded 219 results in the ERIC database. I also pulled useful citations from previous articles that I found. I did this for "mathematics intervention" and "tier 3 mathematics students" as well. Going through the articles and seeing their citations helped me find significantly more relevant research on my particular topic. Once I acquired a more robust list from which to choose, I selected the following three themes to organize my literature review: 1) optimizing grade-level mathematics curriculum 2) instructional scaffolding and 3) mathematics intervention.

I believe it is important to define terms that are used in this dissertation's context. When I refer to "tier-one-heavy," I am referring to classrooms that have majority tier-one and tier two students. When I refer to 'tier-three-heavy," I am referring to classrooms that have majority tier-three and tier two students. This distinction is important in the process of supporting a larger number of students with grade-level mathematics content. I will define what I mean by tier-one, two and three students. Based on tri-quarterly mathematics diagnostic data: students who test at or above grade level are defined as "tier-one"; students who test one grade level below are defined as "tier two"; and students who test two or more grade levels below are defined as "tier-three". These terms are used frequently in my discussion of the literature so I am defining them clearly to start.

## Literature Review

This literature review is structured around three key themes that are central to supporting elementary students struggling with mathematics: optimizing grade-level mathematics curriculum, instructional scaffolding, and mathematics intervention. The first theme, optimizing grade-level curriculum, explores how educators can modify and adapt content to meet the diverse needs of students while ensuring that they engage with grade-appropriate material. The second theme, instructional scaffolding, focuses on the methods teachers use to provide temporary, structured support that enables students to gradually develop independence in mathematical problem-solving. Lastly, the theme of mathematics intervention addresses the specialized strategies and practices used to assist students who are significantly behind their peers, particularly those identified as tier-three. Together, these themes provide a comprehensive framework for understanding how educators can help struggling students access, engage with, and succeed in grade-level mathematics.

**Gaining Access to Grade-Level Curriculum**

Ideally as educators, we want all students to have access to grade-level curriculum so that they are successful in K-12 education and beyond. But when students struggle with mathematics, it is more of a challenge to give them that access. Struggling mathematics students are stuck between having unfinished learning that needs to be addressed and being required to retain grade-level knowledge. Tier-three students are defined by Powel (2015) as "students who demonstrate persistent mathematics difficulty (MD), that is, students whose performance is severely below grade level and who have not responded to tier two intervention, intensive intervention is necessary" (p. 3). Recognizing and defining who tier-three students are is necessary to properly represent the challenges one can be faced with when trying to provide grade-level curriculum.

According to Morin et al. (2017), math word problem-solving is particularly difficult for students with MD. A quantitative study was done to investigate the effects of schematic-based instruction (SBI) with cognitive strategy instruction (CSI). SBI is based on the schema theory and emphasizes the need for students to conceptualize word problems. CSI is a strategy that supports students with deficits in metacognition in solving math word problems. This strategy can be beneficial for tier-three students because if they struggle in reading proficiency, they may be more likely to struggle with conceptualizing mathematical concepts. Studies have found that both dyscalculia and dyslexia can involve deficits in attention, visual processing, and working memory. For example, a study by Landerl and Moll (2010) suggested that these shared cognitive deficits may contribute to the correlation of these disorders.

Supporting students that are at risk to struggle with grade-level mathematics curriculum with strategies is a great step. However, the social context of the child should be considered as well. Culturally relevant mathematics instruction is necessary for students to feel safe enough to retain content knowledge. Battey (2013) suggested that a number of relational interactions raise issues of how these micro-interactions mediated access to mathematics for students of color and those living in poverty: "Addressing behavior, framing mathematics ability, acknowledging student contributions, and attending to culture and language" (p. 125). Students need more than just instruction. Instead, the whole child must be considered and supported in order to reach them academically.

Battey (2013) conducted a qualitative case study to examine the relational nature of teaching in an elementary mathematics classroom that focused on reforms-based teaching practices. Reformed teaching advocates that classes be "taught via the kinds of constructivist, inquiry-based methods advocated by professional organizations and researchers." The study was used to document the types of knowledge, instruction, and relational interactions (as a communicative action between two people that conveys meaning) used with lower socioeconomic (SES) Latino and African American students in elementary school.

According to Battey (2013), the results of the case study showed that in the first lesson Ms. Spencer actively involved her students in understanding mathematical concepts by encouraging them to approach problems in their own ways, prompting them to explain their reasoning, and linking the problems to broader mathematical principles, like the commutative property of addition. She also structured the activity with a teaching progression aimed at guiding students toward making a generalization by the end of the first lesson. In the second lesson, Ms. Spencer continued to push student thinking. Battey (2013) stated that the interactions mediated access to the curriculum through “addressing behavior, framing mathematics ability, acknowledging student contributions, and attending to language and culture” (p. 134). Of the four types of interactions, eight positive interactions were identified: “framing mathematics ability (one episode), acknowledging student contributions (six) and attending to culture and language” (p. 135).

This theme highlights the importance of providing all students, including those struggling with mathematics, with access to grade-level curriculum while recognizing the unique challenges they face. Tier-three students, who demonstrate persistent mathematics difficulties and do not respond to previous interventions, require specialized support, particularly in solving word problems, which can be challenging due to cognitive deficits in areas like metacognition and visual processing. Studies suggest that strategies like schematic-based instruction (SBI) and cognitive strategy instruction (CSI) can help these students conceptualize problems, even if they have reading difficulties. Beyond instructional strategies, previous research emphasizes the need for culturally relevant mathematics instruction, which helps create a supportive environment for diverse learners. Battey’s (2013) research discusses the impact of teacher-student interactions in building access to mathematics, especially for low-income Latino and African American students. Through reformed, inquiry-based teaching practices, educators can better support the "whole child," addressing both academic needs and the social context, fostering a safe learning environment where students can thrive academically.

### Instructional Scaffolding

As stated in Kong and Orosco (2016), instructional scaffolding is defined as an interactive process of learning that is constructed by teachers by gradually decreasing instructional support as students develop the skills necessary to become independent. They suggested that effective math instruction for at-risk minority students (students with racial/ethnic identification based on U.S. Census as Hispanic, African American, two or more races) or with math difficulties (MD) should include

"[a] direct and explicit instructional methods that teach conceptual understanding of math and components of a word problem, (b) visual representation practices intended to generate a mental model to connect verbal information to symbolic comprehension, (c) instructional feedback with peer-assisted learning strategies during instruction, and (d) small group instruction, corrective feedback, modeling, and student verbalizations" (Kong & Orosco, 2016, p. 171).

This approach enables at-risk minority students to build foundational math skills with gradual support, ultimately guiding them toward greater independence in learning. By implementing these targeted strategies, educators can help bridge the gap for students with math difficulties, fostering both confidence and competence in mathematics.

Scaffolding is typically associated with the sociocultural theory of Vygotsky. Vygotsky noted that learning initiates at a social (intermental) stage before progressing to an individual (intramental) level. Stone (1993) builds on Vygotsky's theory and discussed that the student is not merely a passive entity in teacher–student interactions; instead, scaffolding is perceived as a dynamic, interpersonal undertaking wherein both individuals play active roles. They collaboratively construct shared understanding or intersubjectivity through communicative exchanges, facilitating the student's learning from the vantage point of the more knowledgeable other.

Wood et al. (1976) shared the scaffolding metaphor to discuss how adults can contribute to collaborative problem-solving endeavors with students. They drew this from the construction domain. Within the construction domain, Wood emphasized how learning is facilitated through guided support, where tasks are structured to enable learners to "construct" understanding. In this model, the teacher helps break down complex tasks into manageable steps. This approach is especially useful for tasks requiring problem-solving, conceptualization, and critical thinking, and is often used in math and science education to help students tackle complex problems by building a foundation of smaller skills.

Within the educational community, the concept of mathematics instructional scaffolding has been formulated to provide essential support for students. In a study conducted by Brozer and Kilikant (2015), the focus was on identifying the characteristics of meaningful learning of mathematics among low-achieving students (LAS) and emphasizing the challenges these characteristics pose for scaffolding, specifically for its adaptive core known as contingent teaching. As defined by Brozer and Kolikant (2015), *scaffolding* is a method that empowers a child or novice to solve a problem, complete a task, or achieve a goal that would surpass their abilities without assistance.

According to Brozer and Kolikant (2015), some of the low-achieving students exhibited evidence of meaningful strategy construction and utilization. However, their learning processes were marked by inconsistency and difficulty in prediction, featuring progressions and regressions, as illustrated in two case studies. The study explores theoretical and pedagogical implications related to scaffolding, shedding light on six key elements that encompass cognitive, meta-cognitive, behavioral, emotional, and motivational aspects. These elements include activities such as recruiting the learner's interest in the task and demonstrating or modeling the solution to a task. The discussion delves into the intricate dynamics of scaffolding and its implications for enhancing the learning experiences of low-achieving students in mathematics.

**Zone of Proximal Development**

Conceptual understanding, instructional feedback, modeling, and small group instruction are all essential components of scaffolding. Early on, Cazden (1979) connected Vygotsky's *Zone of Proximal Development* (ZPD) to scaffolding and proposed broadening the metaphor beyond parent–child interactions to encompass teacher–student interactions. Vygotsky (1978) stated that the ZPD is “the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers” (p. 86). This process of releasing responsibility from the teacher to the student is also referred to as *fading.*

Gidalevich and Kramarski (2019) carried out their study by focusing on fixed versus faded self-regulatory scaffolds on fourth graders’ mathematical problem solving. Their study indicated that students can be taught self-regulated learning (SRL) in a fixed continuous scaffolding program. However, the fading role of scaffolding to prepare autonomous learning is strong as well. During this quasi-experimental study of fourth graders, Gidalevich and Kramarski (2019) examined the effectiveness of a fixed (continuous) versus faded (graduated reduction).

Results of the Gidalevich and Kramarski (2019) study indicated that the faded group performed best in the metacognition knowledge area, motivation increased, and avoidance decreased. No differences were found in regard to confidence of the students in either group. The study supported the claim that fading scaffolds increase student autonomy SRL (metacognition, motivation) and sense making skills, especially in long term circumstances. This study has revealed a practice that is possible to work. However, it was not with a large group of tier-three students. Ideally, best practice would look differently in a classroom with more extreme needs for support with students' understanding and retention of mathematical concepts.

This fading also takes place in a study conducted by Broza and Kolikant (2015). They discussed the process of scaffolding where the first is contingent (responsive) teaching, which is also known as the adaptive support the teacher gives to the student through discourse. The second is fading, which is where the teacher removes scaffolds as the students gains more of an understanding of the content. Fading is accompanied by the third characteristic which is a gradual transfer of responsibility over to the student. All low-achieving students (LAS) exhibited characteristics of *fragile memory*, which is defined by Broza and Kolikant (2015) as the difficulty that students have to retrieve basic mathematics knowledge from their memory.

Broza and Kolikant (2015) concluded that the interpretation of the scaffolding metaphor that involves a gradual release of responsibility to the students through the removal of scaffolding may not always apply to low-achieving students. They actually determined from the study that there is great difficulty in deciding when scaffolds should be removed in the case of low achieving students. It was suggested that teachers should strengthen students' fragile memory and consider social-emotional aspects that students may be experiencing. Fragile memory gives a reason why tier-three students may struggle with retaining information. Social context of their lives could provide more insight into this issue. However, the fading model seems to be consistently helpful among previous research studies.

**Tier-Three Mathematics Intervention**

While teachers might declare achievement upon concluding a particular lesson, wherein the objectives are deemed accomplished, a considerable number of students, particularly those exhibiting low performance or having disabilities, may not have fully acquired or mastered the specific skills or concepts outlined in the lesson objective (Witzel, 2007). Intervention is provided to students that are identified as struggling with the grade level mathematics being taught. Begney, et. al. (2020) discussed that the intervention provided to the student needs to be clear and organized, involving elements such as offering examples of proficient problem solving, verbalizing thought processes, guiding through practice, providing corrective feedback, and regularly revisiting and reviewing previously covered material. Intervention is necessary for supporting tier two and tier-three students. Looking through the lens of a tier-three-heavy classroom, we will look at what has been introduced in the literature for students that require intervention for mathematics.

According to Dennis (2015), initiatives ought to concentrate on enhancing students' grasp of number concepts and fundamental computation skills. This includes areas such as counting, understanding whole number relationships, adopting strategies for addition and subtraction, achieving fluency in these operations, and comprehending place value. Regarding the teaching approach for interventions, research indicates that effective strategies involve explicit and systematic instruction (including modeling, guided practice, and independent practice), providing frequent opportunities for student responses, and offering corrective feedback. Dennis (2015) shared that interventions of a highly intensive nature (referred to as tier-three) are more effective for students unresponsive to Tier two interventions when they incorporate specific instructional elements. These typically include small group sizes (consisting of one to three students), an extended daily instructional time frame (15 minutes), and a prolonged duration of the intervention. In order for this to be effective in a classroom for this study, there would need to be enough time in the school day to accommodate this type of tier-three intervention

Many tier-three students also struggle with reading comprehension. National Center for Education Statistics (2023) suggested that 13-year old students that engaged in the assessment showed a correlating decline in reading comprehension and mathematics problem solving on the 2022-2023 year assessment. This correlation shows the need for additional support for students’ understanding of word problem solving. Jitendra et al. (2013) compared the efficacy of small-group tutoring on the mathematics learning of third grade students who are at risk for mathematics difficulty (MD) using either a school-provided, standards-based curriculum (SBC) or a schema-based instruction (SBI) curriculum, which is known to be effective in improving students' understanding of story problems and promote meaningful learning. Jitendra et al. (2013) suggested that there are potential benefits of incorporating SBI into small-group tutoring for at-risk students (especially those with higher incoming problem-solving scores). Incorporating strategies to support students' deficiencies during intervention could potentially close the achievement gap more efficiently. However, the question still remains whether or not this is effective with more than 50% of students in a classroom being classified as tier-three. Are small groups feasible with such large numbers needing this intensive support?

VanDerHeyden and Codding (2015) conducted a quantitative study and the purpose of the study was to examine the risk reduction effects of a mathematics intervention overall and across demographic characteristics. The results of the study indicated that the absolute risk reduction associated with the intervention was 15%. "the intervention showed stronger effects in this sample for students of minority ethnicity, students receiving special education services, and students considered at risk based on the prior year's state test score in mathematics, all of which were associated with greater baseline academic risk in this particular sample" (p. 185). This shows that intervention does improve mathematics abilities of tier-three students and reduces academic risks for students. The model for teachers that teach large groups of tier-three students includes intervention. However, what does intervention look like for a large group of tier-three students? Is the intervention provided to the whole group to provide more consistency throughout the week? Or is it directed toward small groups, to provide a more intimate space for student learning? The research does not delve into larger groups, making it difficult to know if it will still work under this circumstance.

Practicing mathematical concepts more frequently through grade level content can support students' retention of mathematical concepts. Haring and Eaton (1978) shared that drill and practice are methods aimed at enhancing fluency for students with mathematics disabilities. The distinction lies in the fact that drill involves the repetitive rehearsal of isolated items recently acquired (such as flashcards), while practice enables learners to apply both recently learned skills and previously established skills in combination.

Students with such mathematics difficulties in previous research have been diagnosed with a term called *dyscalculia*. According to Butterworth (2019), dyscalculia is characterized by challenges in learning mathematics, specifically marked by significant underperformance on standardized tests assessing arithmetic skills. Dehghani (2019) also defined dyscalculia as a condition characterized by challenges in performing calculations, more specifically, counting numbers, difficulty recognizing mathematical operation symbols like addition, subtraction, multiplication, and division, as well as an inability to memorize fundamental mathematical information such as multiplication tables. Tier-three students often also exhibit this same mathematical difficulty.

Something inhibits tier-three students' ability to complete basic mathematical functions and to memorize necessary computation facts that will allow them to complete grade level work. Students may struggle with basic math facts, have difficulty solving problems efficiently, and may take longer to complete tasks (Burns & Gibbons, 2012). Dehghani indicated that the strategies for managing dyscalculia involve effective mathematics instruction from both parents and teachers, engaging in math-oriented games, utilizing multimedia technologies, employing visual aids like drawing figures or diagrams, promoting reading aloud, implementing individual education programs, applying Response to Intervention (RTI) in schools, and incorporating educational psychotherapy. Educational psychotherapy is defined as an approach that combines educational techniques with psychotherapeutic principles to support students in their learning and emotional development. It focuses on addressing the psychological barriers to learning, such as anxiety, trauma, or low self-esteem, and helps students develop coping strategies while improving their academic skills (Rosen & Schneider, 2013). The integration of computer-aided technologies can mitigate academic challenges, enhance predictability, and improve students' ability to reason and solve homework. This list of support is quite similar to what is offered for English Language Learners and students with learning disabilities in schools. Which now brings forth the question, should testing as a tier-three student be considered the same as a disability? Possibly, students will show similar risk reduction from the same provided support.

Motivation plays a large role when working with tier-three students who typically struggle with mathematical concepts. Bottge and Hasselbring (1993) shared in their study that students who fail to achieve proficiency in fundamental skills within a curriculum are prone to encounter increased difficulties and frustration later in the academic year, and potentially in subsequent mathematics courses. According to Dehghani (2019), dyscalculia results in issues with a student's behavior, contributing to low self-esteem that may persist into adulthood. Suggestions have remained that expectations should remain high when supporting tier-three students: “Pedagogical recommendations include engaging students in challenging activities, promoting active construction of mathematical understanding, facilitating discussions that probe for alternative ways of thinking, and employing assessment strategies that guide teaching and learning” (Butler, et. al., 2005, p.157). This seems that motivation can greatly impact any classroom, but more importantly, it can change the entire dynamic when more than 50% of the students are tier-three.

**Teacher Efficacy with Tier-Three Students**

Resources are already limited for teachers but they can be significantly more limited when working with large numbers of tier-three students. Students who are significantly behind but are also not provided extra resources nor funding, employing pacing guides proves beneficial as it assists teachers in excluding extraneous concepts or skills that do not align with state standards or are not assessed in end-of-year state evaluations. However, adhering to the curriculum timeline necessitates students to grasp skills and concepts within comparable timeframes (Witzel, 2007). Bottge and Hasselbring (1993) discussed that “teachers are left with the daunting responsibility and labor-intensive task of modifying the curriculum to meet the needs of all students in addition to adequately and effectively teaching all of the relevant state mathematics standards” (p. 15). It's important to note that these dimensions—content, social, and time—do not constitute tangible cognitive requirements for teachers in the process of making planning decisions (König et al., 2021). The teacher’s ability to support students on different levels can impact student academic growth and achievement. Hernita et al (2022) discussed that the teacher plays a vital role in education and learning, with their capacity to select approaches, methods, and instructional strategies being crucial factors influencing the success of students. Teachers must have the proper resources and tools to support tier-three students in order for them to be successful.

Soo and Fu (2022), conducted a study finding that there is no significant difference in teacher efficacy based on gender or beliefs, but in academic qualifications.

Previous research shows that many teachers have an insufficient understanding of the characteristics, symptoms, and intervention strategies related to difficulties in learning mathematics. Teachers generally share a common comprehension of diagnosing, evaluating, and predicting challenges in mathematics learning when planning for a lesson. Even the teachers with greater experience did not exhibit a higher level of understanding regarding difficulties in learning mathematics or the strategies to mitigate this particular learning challenge (Wijaya et al, 2019, Sousa et al, 2017). Another research study completed in Malaysia also showed that teachers had insufficient knowledge of mathematics difficulties in their students and how to accommodate them (Fu & Chin, 2017). This shows that there is no particular demographic of teacher that has more or less understanding of supporting tier-three students. Seems as though this only comes from experience of working with actual tier-three students through essentially trial and error of reviewing student data.

## Conclusion

In conclusion, I looked at what is currently known through research about scaffolding and interventions in teaching mathematics at the elementary level, particularly with Tier-three students. I learned about strategies that previous research has shared to help tier-three students have access to grade level mathematics curriculum. I also looked at the origin of scaffolding and how it has been adopted from psychology into educational research, seeing how teachers use scaffolding to support students as they struggle with completing mathematical tasks independently. Fading shows the process of scaffolding where the student start with teacher guided models and representations into

Vygotsky’s Zone of Proximal Development where the student can work independently on grade level tasks.

Lastly, I looked at tier-three mathematics intervention and the term dyscalculia. Dyscalculia research showed that there is previous understanding of tier-three students, not as a classification, but recognized as a disability that needs additional resources and support. Making the connection between the two has helped me see what has worked well when a similar group of students are supported as if it is a disability, those students receive similar support such as effective mathematics instruction from both parents and teachers, engaging in math-oriented games, utilizing multimedia technologies, employing visual aids like drawing figures or diagrams, promoting reading aloud, implementing individual education programs, applying Response to Intervention (RTI) in schools, incorporating educational psychotherapy, and the integration of computer-aided technologies can mitigate academic challenges, enhance predictability, and improve students' ability to reason and solve homework, while also considering the motivational aspect that keeps students and teachers in a positive state to complete such challenging tasks. This is not currently how we service tier-three students. I rely on the teacher to create scaffolds, supports, and interventions in order to teach grade level curriculum to students that are functioning at two or more grade levels below. This literature review serves a base of what strategies teachers use to support tier-three students. In my dissertation, I will delve into what these strategies look like in a majority tier-three student setting.

CHAPTER THREE

METHODS

## Overview

In the evolving landscape of education, understanding the instructional strategies employed by teachers in diverse classroom settings is essential for fostering effective learning environments. This descriptive case study aims to investigate the experiences and thought processes of elementary math teachers who face the distinct challenges of teaching majority tier-one or tier-three student populations. By focusing on a comparative analysis of two educators—one serving a predominantly tier-one classroom and the other a tier-three classroom—this research seeks to illuminate the complexities of math instruction in a large school district in an urban mid-western city. Utilizing a holistic and intrinsic approach, as characterized by Yin (2014) and Stake (1995), the study aspires to provide a nuanced portrayal of teaching practices, ultimately giving voice to teachers navigating the unique realities of their students' needs. Through detailed classroom observations and semi-structured interviews, this research will contribute valuable insights for all stakeholders in the educational community on how we support large groups of tier-three students. This research is a starting point to possible future research in methods that can be beneficial to urban school districts.

All elementary math teachers in this school district are required to teach 60 minutes of core math instruction and 40 minutes of small group math instruction per day. Here, I conducted a *comparative case study*. According to Ragin and Becker (1992), comparative case studies are research methods that involve examining two or more cases to identify similarities and differences across them. This approach enables researchers to understand how different contexts or conditions influence outcomes, providing deeper insights into specific phenomena. Comparative case studies can enhance the generalizability of findings by contrasting cases that exhibit varying characteristics. This data collection may involve observations, interviews, audiovisual materials, documents, and reports (Creswell & Poth, 2018).

Case study begins with Freud where he discussed the case analysis of a problem in medicine and now it is heavily used in the educational community. This design is also referred to as holistic (Yin, 2014) and intrinsic (Stake, 1995). A *holistic design* examines the case as an integrated, indivisible whole. This approach is often used when the research focuses on a complex system or phenomenon and aims to understand how its components interact within the broader context. Holistic case studies are suitable for exploring overarching themes, such as the culture or decision-making processes of an organization, without isolating specific subunits. Yin (2014) argues that holistic designs are particularly effective when the research questions are broad and encompass the entire entity, such as an organization, program, or system. However, Yin cautions that a holistic approach may oversimplify the case if the researcher does not adequately address its internal complexities.

In contrast, an *intrinsic design* focuses on a case that is inherently interesting or unique. This approach is used when the researcher’s primary motivation is to understand the specific details and context of the case itself, rather than to contribute to broader theories or generalizations. For example, an intrinsic case study might explore how a small, rural community rebuilt after a natural disaster, with the emphasis placed on the particular circumstances of that community. Stake (1995) emphasized the value of intrinsic case studies in providing deep, contextualized insights. According to Stake, the purpose of this approach is not to generalize findings but to appreciate the richness and singularity of the case.

The key difference between these approaches lies in their purpose and scope. A holistic design seeks a broad understanding of a system, aiming to capture the interconnections and overarching patterns within the case. On the other hand, an intrinsic design narrows its focus to the unique aspects of a specific case, prioritizing depth over generalizability. While holistic designs may contribute to theoretical insights or systemic understanding, intrinsic designs focus on the case itself, providing detailed accounts of its unique characteristics. My comparative case study will take an intrinsic approach to learn the unique stories of the teachers that teach a specific population of fifty percent tier-three students compared to teachers that teach a population of fifty percent tier-one students.

Both Yin (2014) and Stake (1995) offered complementary perspectives on these designs. Yin advocates for methodical and systematic research, noting that holistic designs are ideal for exploring large, integrated systems but warns against overlooking critical details. Meanwhile, Stake emphasizes the importance of understanding the intrinsic value of a case, focusing on depth and specificity rather than broader applicability. By carefully aligning the research design with the study's goals and the nature of the case, researchers can effectively navigate the choice between holistic and intrinsic approaches.

The research goal is to develop a complete, detailed portrayal of some phenomenon, "to get the story down for the possible benefit of policy makers, scholars, and other citizens" (Odell, 2001, p. 162), or, in some situations, to give voice to people who are marginalized, disadvantaged, excluded, or vulnerable. The goal is to compare the differences between the planning process for teachers that teaches a large group of tier-one students and teachers that teach a larger group of tier-three students. The reason why I selected this research method is because I wanted to show what these teachers experience and highlight their thought process on how they strategize to support their students. I wanted to share the focus of the teachers and where they spend most of their time.

At times, the focus of a case study's detailed description may center around a singular instance, such as the life story of an individual, a specific event, an organization, or a particular group. At different instances, the emphasis on description entails illustrating shared similarities (Ragin & Amoroso, 2011). In the case of my research I focus on similarities and differences among six teachers with different student populations through a comparative case study. I wanted to hear both teachers that teach a tier-one-heavy classroom and teachers who teach a tier-three-heavy classroom to show a comparison of their experiences under two different circumstances. My ultimate goal is to provide a voice for our teachers and the reality they are in, and I believe a qualitative comparative case study will best reflect that goal.

**Selection of Participants**

In this study, I observed and interviewed six total participants. The teachers were selected from two different schools within the same difference. One of the schools was selected because they have higher test scores compared to the rest of the district. The other school was selected based on convenience. Three observations were teachers that have a tier-one-heavy classroom. These teachers were required to have a class that consists of fifty percent or more tier-one students at the start of the school year. I also observed and interviewed three teachers with a tier-three-heavy classroom. These teachers were required to have a class that consists of fifty percent or more tier-three students at the start of the school year. Teachers needed to meet these criteria to ensure validity of their experience as it relates to the purpose of this study overall. All the teachers varied in years of experience, educational background. All teachers teach in an elementary mathematics classroom between second and fifth grade. All the participants were given the opportunity to opt out at any time throughout the study.

**Research Design**

To collect data, I conducted a qualitative comparative case study that consisted of classroom observations and semi-structured teacher interviews. Classroom observations and semi-structured interviews are often used in educational case studies with similar settings today (see Talaee & Schrittesser, 2023; Demir & Çatak 2023). I selected these two modes of data collection to see what teachers do consciously and subconsciously to support students in their classrooms. Observations and interviews were completed with three tier-one-heavy classroom teachers and three tier-three-heavy classroom teachers. The tier-one teachers served as a control group to help understand the difference in planning process between the two types of classrooms.

## Description of Instruments

Instruments that were used to collect data include six 60-minute observations which were conducted during teacher-led mathematics instruction and six 40-minute teacher interviews which were conducted after the observations. For the observations I descriptively took notes on what the teacher said and did during the full duration of the lesson. For the semi-structured interviews, these are the questions that were asked:

1. Describe your planning process for the lesson that was observed.
2. You have a large number of tier-three/one students. What strategies did you use to ensure that your students were successful with this lesson?
3. Based on the exit ticket and/or informal observation, how many students would you say met the target of this lesson? How many did not?

## Data Analysis

Data were analyzed from the observations and interviews through the use of Corbin and Strauss' (2008) open, axial, and selective coding. During open coding, the information was systematically "broken down", leading to the formulation of various concepts that can serve as foundational elements for the model. When breaking down the observations and interviews, I created themes from items that repeated themselves or stood out in what was observed or discussed. If the teacher mentioned something more than once, it was considered for tracking throughout the break down process.

Axial coding works towards enhancing and distinguishing existing concepts, elevating them to the level of categories. Once I went through and highlighted items that stood out, I organized them into common themes. This allowed me to see the areas that the teachers focused on during the lesson and during their thought process. By grouping similar ideas and recurring patterns, I was able to identify relationships between the themes, uncovering how certain concepts interconnected or influenced each other. This process provided a deeper understanding of the teachers' priorities and strategies, helping to reveal not only what they emphasized but also why those areas were significant in the context of their teaching practices.

In the selective phase, the researcher takes on an authorial role, actively utilizing the established categories, coding notes, memos, networks, and diagrams. For the interviews, I recorded the interview using my voice memos application in person with each participant. After that, I transcribed the voice memos. For coding, I highlighted the sentences and wrote the theme in red after each highlighted sentence which will be shared in the results section of this dissertation. All structures and questions were planned to ensure consistency throughout the study.

**Ethical Considerations**

I have considered ethically that it is best to focus on the teacher and the teacher’s thinking alone. There could be a viewpoint where we look at how the teacher’s strategies impact student achievement. However, for the purpose of this study, I only look at what the teacher is doing during observations and interviews. Teachers were assured of confidentiality throughout the study. This focused approach ensures that the findings remain centered on the teachers' experiences and strategies, fostering a clearer understanding of their instructional processes without the influence of external variables related to student performance.

# CHAPTER FOUR

# RESULTS

## Overview

This chapter presents the results of this study, examining how teachers address the diverse needs of students in tier-one-heavy and tier-three-heavy classrooms. Through a combination of classroom observations and teacher interviews, this chapter explores the strategies used to optimize grade-level mathematics curriculum and foster student engagement across both settings. The chapter begins by analyzing the actions and instructional approaches observed in tier-one-heavy classrooms, where students are primarily on grade level according to diagnostic assessments. It then transitions to tier-three-heavy classrooms, where students often function two or more grade levels below, requiring intensive interventions. Finally, the chapter compares the instructional styles, pacing, and student dynamics in these contrasting environments, highlighting key distinctions in teacher strategies and the implications for student learning. This analysis underscores the critical role of differentiated instruction in addressing the diverse academic and behavioral needs of students, ultimately contributing to a deeper understanding of equitable teaching practices in mathematics education. This chapter provides results after analyzing the two questions in chapter one.

1. How do teachers optimize grade-level mathematics curriculum for large groups of students who function at two or more grade-levels below?
2. What strategies do teachers utilize to address large numbers of tier-three students?

The first section will discuss the results from the tier-one classroom observations and teacher interviews. The second section will analyze the results from the tier-three classroom observations and interviews. Finally, I will discuss the comparison between the two class types and the impact that it has on teacher planning.

I would like to preface this by noting that all teachers in this study are from the same school district and utilize the same mathematics curriculum. This means that the teachers had similar structures to their observations. I think this is important to note, because it was noted that items of the curriculum have been modified to meet the needs of the students. However, they are originally the same structure lessons for every classroom.

## Observing Tier-Three-Heavy and Tier-One-Heavy Classrooms

For the observations, to show the difference between how teachers optimize their lesson in a tier-one-heavy classroom compared to teachers of a tier-three-heavy classroom, I observed the same items, teacher actions. I observed the types of questions the teachers asked. Also, I observed the number of scaffolds that were provided for the students throughout the lessons, as well as how many times the teacher needed to model the mathematics for their students to assist with student understanding. I used a teacher-centered observation model to note only the teacher's actions and words that were said during the lesson. A teacher observation model where the observer focuses exclusively on what the teacher says and does can be referred to as a *teacher-centered observation model* or a *teacher-focused framework*. Shulman (1987) discusses the importance of focusing on teacher behaviors and pedagogical content knowledge as a means of understanding effective teaching practices. Similarly, Bellack et al. (1966) pioneered a structured, teacher-focused observational method through their research on "interaction analysis," which records teacher statements and actions during classroom instruction. This aligns with the broader tradition of *process-product research*, which concentrates on teacher actions (processes) and their correlation to student outcomes (products) (Gage, 1978).

I also analyzed how many opportunities students had to share their own thinking or their own work with the class, which is labeled as student involvement. Lastly, I observed what the teacher chose to work on in their small group instruction time in relation to the students' levels and the lesson that was taught for the day.

**Excelling Grade Level Instruction in Tier-One-Heavy Classrooms**

My first research question was framed around how teachers optimize grade-level curriculum for tier-one and tier-three students. To analyze the data I used open, axial, and selective coding (Corbin & Strauss, 2008). To start with open coding. I read through the observational notes of what the teachers said and did during their lesson. This opened up common themes, types of questions the teachers asked, moments they provided scaffolds, moments they modeled the math, and the times they allowed students to share their own thinking.

The types of questions that were asked are close-ended questions which are typically used to assess recall, comprehension, or understanding of discrete knowledge or facts. Close-ended questions can be effective for gauging basic knowledge or checking for understanding during lessons but may limit opportunities for critical thinking or elaboration (Ary, Jacobs, & Sorensen, 2010). The next type of question found was guiding questions. Guiding questions are open-ended prompts designed to lead students toward deeper understanding and critical thinking by encouraging exploration, analysis, and reflection (Wiggins & McTighe, 2005). The last type of question observed was probing questions. Probing questions are follow-up inquiries that dig deeper into a student's initial response to clarify understanding, explore reasoning, or extend thinking. These questions encourage students to elaborate, justify their answers, or consider alternative perspectives, fostering critical thinking and deeper engagement with the material (Wragg & Brown, 2001). These are the common themes that were observed in the tier-one-heavy classrooms (see Table 1).

**Table 1**

*Observational Themes in Tier-One-Heavy Classrooms*

| Emerging Themes of Teacher Actions | Frequency |
|---|---|
| Close-Ended Questions | 8 |
| Guiding Questions | 5 |
| Probing Questions | 17 |
| Scaffolds | 0 |
| Student Involvement | 29 |
| Teacher Modeling | 3 |

It was found that teachers in a tier-one-heavy class asked a total of 30 questions combined during their lessons. Of those 30 questions, eight of them were close–ended, which only sought a specific answer from students. The answers were either a single word or a specific sentence. Those answers were also a clarifying question or seeking a recall of a specific mathematical rule. None of the teachers in the tier-one-heavy classes provided scaffolds for their students. Most of the students were able to solve problems on their own without the extra support. The teachers in this class setting provided a total of 29 opportunities for students to model or explain their thinking. There were only three occurrences when teachers modeled the math for the class to help with understanding among the three classes as a whole.

After open coding to find common themes, I moved into axial coding. Axial coding builds on open coding by reassembling the data in a more structured way, connecting the categories and subcategories identified in the earlier phase. The goal of axial coding is to move from fragmented data to a deeper, more integrated understanding of the phenomenon being studied (Strauss & Corbin, 1998). Here I was able to bring meaning to the themes that were identified. I first looked at the types of questions the teachers asked. The reason for this is because there was a large difference in the types of questions asked from tier-one-heavy teachers compared to tier-three-heavy teachers. The types of questions that were observed were close-ended, guiding, and probing questions.

**Optimizing Grade Level Instruction in Tier-Three-Heavy Classrooms**

Similar themes were found among the tier-three-heavy classrooms as well. The same types of questions were asked but they were asked at different rates. The teachers exhibited common themes that aligned. I collected the teachers' actions and developed themes below that are identical to what was observed in the tier-one-heavy classrooms. However, they were found at different rates (see Table 2).

**Table 2**

*Observational Themes in Tier-Three-Heavy Classrooms*

| Emerging Themes of Teacher Actions | Frequency |
|---|---|
| Close-Ended Questions | 15 |
| Guiding Questions | 18 |
| Probing Questions | 8 |
| Scaffolds | 14 |
| Student Involvement | 8 |
| Teacher Modeling | 13 |

My analysis found that the tier-three-heavy classroom teachers asked a total of 41 questions combined throughout their lessons. Of those questions, 15 of them were close ended, 18 of them were guiding questions, and only 8 of them were probing questions. Teachers of the tier-three-heavy classrooms provided a total of 14 scaffolds to support their students' learning. They provided only eight opportunities for students to share their thinking and modeled the mathematics to help with student understanding a total of 13 times.

## Comparing Tier-One and Tier-Three-Heavy Classroom Instruction

There were some distinct differences in the data from the classroom observations. The tier-one-heavy classes focused on general instruction provided to all students, regardless of skill level, and aimed to ensure mastery of fundamental concepts while encouraging advanced exploration when applicable. Students were actively involved in academic discourse, encouraged to explain their reasoning, and learn from peer strategies. Teachers emphasize fostering critical thinking by guiding students to explore problems independently before providing direct instruction. This approach supports diverse student abilities, allowing for differentiation and opportunities for advanced learners to explore more challenging concepts.

In contrast, the tier-three-heavy classes were designed for students who require intensive intervention and support. These classes prioritized small-group instruction led by the teacher to address specific skill gaps and provide explicit instruction. Lessons were heavily scaffolded to ensure that students understand foundational concepts and address any misconceptions. A variety of tools, including manipulatives, visual aids, and targeted digital programs like Zearn or i-Ready, were used to reinforce learning. Tier-three-heavy classes move at a slower pace, focusing on mastery of essential skills and providing repeated exposure to ensure retention and understanding.

The types of questions that the teachers asked highlighted differences in the data. The tier-one-heavy teachers asked 11 fewer questions than tier-three-heavy teachers. However, they asked nine more probing questions than tier-three-heavy teachers did. The reason this is significant is because the tier-one-heavy teachers had the opportunity to ask higher level questions of their students. On the other hand, the tier-three-heavy teachers stuck to asking more lower-level questions throughout their lessons. Tier-three teachers asked a total of 33 guiding and close-ended questions while tier-one-heavy teachers only asked 13 as a whole. These data show that when working with majority tier-one students, the teacher chooses to engage students in questions that require them to share their thinking as well as the thinking of their classmates. When working with majority tier-three students there were more occurrences where the teacher needed to ask guiding and close-ended questions to keep up with the pace of the lesson. The main differences between tier-one and tier-three-heavy classes lay in their goals, instructional styles, and pacing. Tier-one aimed to broaden understanding and foster exploration among a diverse group of students, promoting independence and collaborative learning. In contrast, tier-three focused on remediation and foundational skill development, often requiring significant teacher intervention and hands-on activities. While the tier-one teachers were able to encourage students to work independently and collaboratively, tier-three provides structured and individualized support to ensure struggling students can achieve mastery. These distinctions underscore the tailored approaches educators use to meet the diverse needs of their students effectively.

## Comparing Tier-One and Tier-Three-Heavy Teacher Strategies

After coding the interview data, I developed themes that tier-one-heavy and tier-three-heavy teachers spoke to most consistently. My second research question is about what strategies teachers utilize to address large numbers of tier-three students. To ensure consistency in the study I asked the same questions to tier-one-heavy teachers and to tier-three-heavy teachers. The tier-one-heavy teachers shared their experiences to develop major key themes (see Table 3).

**Table 3**

*Themes in Tier-One-Heavy Teacher Strategies*

| Emerging Themes of Teacher Strategies | Frequency |
| --- | --- |
| Student Discourse | 6 |
| Anticipating Misconceptions | 4 |
| Partner Work | 3 |
| Fluency | 3 |
| Independent Work | 4 |

I coded five key themes from the tier-one-heavy teacher interviews. The data from the table highlights key themes in teacher strategies and the frequency that they discussed this topic during the interviews. Student discourse was discussed a frequency of 6 times during the tier-one teacher interviews. It also emerged as the most emphasized strategy, indicating that teachers prioritize fostering discussions where students share and explain their reasoning. This approach promotes deeper understanding through collaborative learning.

Anticipating misconceptions and independent work, each with a frequency of 4, are the next most frequently employed strategies. Anticipating misconceptions suggests that teachers actively plan for and address potential errors or misunderstandings to support accurate learning. Independent work allows students to engage directly with tasks, reinforcing autonomy and individual problem-solving skills. Partner work and fluency, both with a frequency of 3, show that these strategies are used less frequently but still play a vital role. Partner work encourages collaboration in smaller groups, fostering peer support and cooperative learning. Fluency activities focus on building automaticity and efficiency in key skills, which are foundational for success in mathematics. Overall, the data reveal that teachers balance a range of strategies to address different aspects of learning, with a particular emphasis on interactive and student-centered approaches.

After coding the tier-three-heavy teachers' interview data, I identified themes that were frequently discussed in relation to their instructional strategies. The tier-three-heavy teachers shared their experiences, leading to the development of significant key themes (see Table 4).

**Table 4**

*Themes in Tier-Three-Heavy Teacher Strategies*

| Emerging Themes of Teacher Strategies | Frequency |
|---|---|
| Foundational Skills | 3 |
| Home Life | 2 |
| Intervention | 3 |
| Scaffolding | 3 |
| Attendance | 3 |

The data in Table 4 highlights key themes in teacher strategies for Tier-three-heavy classrooms and their frequency of use. Foundational skills, intervention, scaffolding, and attendance, each with a frequency of 3, stand out as critical strategies. The emphasis on foundational skills reflects the need to address gaps in basic knowledge, ensuring that students have a strong base to build upon. Similarly, the frequent use of scaffolding and intervention demonstrates the teachers' focus on providing structured support and targeted assistance to meet the specific needs of Tier-three students. Attendance is also a notable theme, underscoring the importance of consistent student presence in achieving progress and maintaining instructional continuity.

Home life, with a frequency of 2, highlights the role that external factors play in student performance and the strategies teachers employ to engage with and support families. This lower frequency compared to other themes may suggest that while home life is important, it is less directly addressed in daily classroom strategies. Overall, the data reflects a comprehensive approach by Tier-three-heavy teachers, combining foundational skill-building, structured interventions, and support for external factors to help students overcome challenges and achieve academic success.

## Interviews

After reviewing the interviews there were three overarching themes: context, instruction, and pace and content. There are several sub themes that fall into each category that both classrooms had. This study explores how educators optimize grade-level mathematics curriculum, manage small-group interventions, and foster student engagement in these contrasting settings. The findings reveal critical distinctions in teacher approaches, student involvement, and the use of scaffolding, offering valuable insights into the importance of differentiated instruction to support equitable student achievement.

### Context

The teachers were asked about their students' home lives and what they may return to after they leave school for the day. The tier-one-heavy teachers did not say much about their students' home lives. However, tier-three-heavy teachers had significant concerns about their students' home lives. Teacher D shared their concerns for one of their students saying, "*They were telling me at one point, their family had no front door on the house, not a screen door, but I mean, a front door*." Teacher F also shared similar concerns stating, "*I've noticed students who gets to school an hour and a half late and still sleep in class*." Teacher F implied that their students that come to school late but are still tired enough to sleep in class, may not be sleeping well at home.

Family involvement was discussed during teacher interviews to explore the support that students receive at home with their academics. Tier-one-heavy teachers shared high parental support for students. Tier-one-heavy teacher A shared about their students that "*their family involvement is there, they're the ones that I see come to the parent teacher conference, they came to welcome back to school, you know, they stopped me and talk to me.*" Tier-one students' parents seem to be more persistent to speak with their child's teacher. They try to take any opportunity to speak with the teacher. Tier-one-heavy teacher B stated that their students' "*parents are able, for the most part, to actually look over their (students') work and check it. And even the ones that aren't, that are honest about the fact that they really just don't know.*" Tier-one students receive help on homework and it is usually looked over before turning it back in. Tier-one-heavy Teacher C also shared that "*they have strong parental support at home.*" All tier-one-heavy teachers shared similar sentiments in the fact that their tier-one students have strong parental support at home.

In the tier-three-heavy setting there was also strong data around parental support. Tier-three-heavy teacher D stated:

"*I think over the course of the year, it seems that I want to say so we have will say like 75 fifth graders or 85 fifth graders. And the last parent teacher conference we had, I believe that we saw about 25 parents*."

Tier-three-heavy student families do not typically come to parent teacher conferences to speak with teachers. Conversely, tier-three-heavy teacher D also shared that they "*have a few parents, a handful of parents like that right now, that, you know, I speak to daily at dismissal.*" Teacher F stated that "*sometimes the parent isn't the most supportive person, but there are other extended members in their family that is, and then some of them have no family support.*" This highlights the varied levels of family involvement in tier-three-heavy settings, ranging from consistent communication with a few dedicated parents to a complete lack of support for some students.

**Social Skills/Behavior**

Behaviorally, tier-one-heavy teachers focused on student interactions. Tier-one-heavy Teacher C shared,

*"We had to kind of get a couple of personalities together. So I would say it was more so just practicing, like the routines and everything, and getting everybody to be able to collaborate correctly and respectfully."*

Tier-one-heavy teachers discussed more of the way students engaged in conversation with one another. This could be connected to the large amount of student discourse that was covered in their interviews.

Tier-three-heavy teachers discussed more mixed reviews of students' behavior. Teacher D shared for one of their classes that "It was a nice first month, beginning of the school year, and then we kind of had problems." Then also stating for their second class that "... they are pretty well behaved. And I don't think their behavior would negatively affect their grades." Tier-three-heavy teachers did not share any significance that behavior or social skills were a barrier for student achievement.

Gottfried (2010) found that attendance positively impacts learning outcomes, including GPA and performance on standardized tests, as students who attend school regularly benefit from teacher-led instruction and peer interactions that enhance understanding. In tier-one-heavy classrooms Teacher B shared "*if they ever miss, they're responsible, and I don't really have any issues with them, like missing work or anything like that, or them not being able to keep up once they return.*" Tier-one-heavy teachers shared that students have mostly good attendance. Good attendance could be a habit of tier-one students. Mathematically, a teacher that has majority tier-one students, may not experience many attendance issues. In some cases, Teacher B did share that "... *even though they don't attend as regularly as everyone else, when they do miss their assignments.*" This could mean that tier-one students who miss school, still have the responsibility to complete the work that they miss.

Tier-three-heavy teachers shared that attendance is a huge barrier for their students. Teacher D shared "*I would say there's about four or five absent consistently.*" Teacher E stated that "*we have a lot of chronically absent.*" Teacher F shared the same sentiments, "*I probably got 20 that come regularly out of 29 students.*" All three tier-three-heavy teachers shared that chronic student absenteeism was more common. They did not, however, share that students complete missing work when they are absent from school.

**Access to Grade Level Content**

Both of the two types of classes took the same mathematics diagnostic at the start of the school year, iReady. The tier-one-heavy classes were not necessarily advanced. However, they were mostly on grade level. Tier-one Teacher B stated that "*I want to say nobody was already beyond grade four.*" However, after working with them for a year, they stated that "*they were on grade level when they started, when they started, but now, like, they're probably, they are closer now, just in their mindsets and what I've seen towards being on fifth grade level*." The tier-one-heavy class arrived with robust prior knowledge, ready to take on the next grade level.

In the tier-three-heavy classrooms, the teachers shared that the majority of their students arrived with gaps and lacking skills. Some shared beginning of the year diagnostic results with one stating, "I had 88% in tier-three at the start of the year" and another sharing *"I would say 45% (tier-three). That's a gift."* Tier-three-heavy Teacher E went into depth sharing that

*"Quite a few of them were two or three grade levels behind. So they needed foundational skills. Definitely numbers and operations. Measurement was pretty low. And geometry normally is pretty low anyway, but pretty much all of them were low."*

Tier-three-heavy teachers experienced receiving students with large gaps, greatly below grade level in all domain areas at the start of the school year.

Only tier-one-heavy teacher C discussed that they planned for students that might struggle with the lesson stating,

> "*I had to kind of anticipate, like which ones would be the most difficult… I didn't want them getting frustrated with the ones that were too difficult where they had to take a lot of extra steps*."

Other tier-one-heavy teachers shared that they did not anticipate students struggling. However, they did anticipate what types of strategies students may try to use. Tier-one-heavy teacher A shared, "*sometimes just anticipated certain questions and strategies that would come up throughout when they were doing the lesson*." As well as teacher B who shared that they anticipate "*something interesting that somebody might bring to the table that they may have learned at home, or just kind of try something new that day.*" Tier-one-heavy teachers still anticipated that students may have misconceptions about the lessons they were teaching. In addition they also thought about other ways that students would go about solving the problems.

Tier-three-heavy teachers shared that students "*seem to struggle mightily because of it not having just those basic fundamentals*." They also shared concern about teaching grade level skills asking, "*how can we expect them to be on grade level when they don't have foundational skills?*" Tier-three-heavy teachers anticipated that students would struggle with the curriculum because they struggle with basic mathematics skills such as addition, subtraction, etc. To support students, they did share that students need additional support in these foundational skills to be successful with grade level content.

Fluency in mathematics refers to the ability to perform basic calculations efficiently, accurately, and flexibly, allowing students to focus on higher-order problem-solving and conceptual understanding (National Mathematics Advisory Panel, 2008). When students achieve fluency in operations such as addition, subtraction, multiplication, and division, they free up cognitive resources, enabling them to tackle more complex tasks without being hindered by basic computations (Kilpatrick, Swafford, & Findell, 2001). Knowing fluency facts can help students answer grade level math problems more efficiently. Teachers in the tier-one-heavy setting shared that students typically arrive already knowing their fluency facts. Tier-one-heavy teacher B shared that "*the higher group they catch on so quick, you know, and I had to give them such a challenge*." All of the tier-one-heavy teachers shared the same experience. Students know their fluency facts and they are always looking for a new challenge and a new way to solve a problem.

The experience of the tier-three-heavy teacher was significantly different. Tier-three-heavy students as teacher F shared, "*do not have their facts memorized, unfortunately, and they seem to struggle mightily because of not having just those basic fundamentals.*" Other tier-three-heavy teachers discussed that they spend some of their time each day teaching these basic fundamentals that students may be missing. Tier-three-heavy teacher D shared, "*with fluency, I'll use that time to try to reach back and hit some prerequisites that they may not have*." When teachers need to refer back to prerequisites, it seems to take time away from the grade level lesson. This was also noticed during observations. Tier-three-heavy classes all engaged in a brief reminder of basic fluency before or again during the lesson.

Research emphasizes that student engagement in mathematics significantly enhances learning outcomes, critical thinking, and problem-solving skills. Engaged students are more likely to actively participate in learning activities, collaborate with peers, and persist through challenging tasks, fostering deeper understanding and long-term retention of mathematical concepts (Fredricks, Blumenfeld, & Paris, 2004). High levels of engagement are linked to improved academic achievement, as students who are actively involved in their learning process demonstrate better comprehension and application of mathematical ideas (Attard, 2011).

The tier-one-heavy teachers discussed a significant amount of student involvement that occurs in the classroom. Tier-one-heavy teacher A shared, "*They are able to explore on their own and make connections with each other, and I'm just kind of there to facilitate and really fill in those gaps if there's any parts of the concept that they don't understand.*" The tier-one-heavy classrooms were significantly more student-led. Teachers of these classes all shared similar stories of students. Students mainly work together, and the teachers support students when they see they may need additional support.

Tier-three-heavy teachers shared that their students struggle more throughout the lesson. Tier-three-heavy teacher D stated, "*they're really shy, sweet kids, you know, and it's really hard to get them to talk about math.*" Tier-three-heavy classrooms are much more teacher driven. The teacher conducted most of the speaking for the students. Tier-three-heavy teacher F shared that their students prefer more individual work rather than discussion stating, "*I have allowed them to work in pairs. And I've allowed them to work in groups. They kind of still do it on their own*." Tier-three students may have difficulty discussing math with other students. It is unsure the true reason why tier-three students feel so much more uncomfortable with student discourse than tier-one students.

Scaffolding was not seen in the tier-one-heavy classrooms the same as it was in the tier-three-heavy classrooms. Tier-one-heavy teacher C shared, "*on a normal day, I* *don't give them strategies*." However, on this day, teacher C shared that they did struggle stating,

> "*Today, they definitely did struggle with the algebra, and that's understandable, like I already kind of anticipated that, so that is why I kind of helped them along. Some of the other ones, they struggled a little bit because they were interpreting*."

Tier-one students received scaffolding for complex tasks such as algebra and interpreting. However, teachers shared similar stories that students normally do not need support and the teacher spends most times only facilitating the lesson.

Tier-three-heavy teachers shared an alternative perspective of scaffolding for their students. Tier-three-heavy teacher D shared, "*during fluency, I definitely try to maximize, you know, throw in as many things that they're lacking as I can*." Finding opportunities to fill in missing prerequisites for the grade level curriculum is often thought about. When teaching grade level content, tier-three-heavy teacher F shared that they "*break the work into chunks. Sometimes the whole assignment can seem overwhelming… I use manipulatives. I use them especially when we did multiplication*." Tier-three-heavy teachers experience the need to scaffold grade level content, even when the concepts are as simple as basic fluency. Breaking content up, providing manipulatives, and practicing fluency allows tier-three students an opportunity to grasp grade level concepts.

Tier-one-heavy teachers shared that tier-one students have a strong memory. Tier-one-heavy teacher C stated, "*all the strategies that they're using now is pretty much just a culmination of pulling little bits and pieces from all the other lessons that we've done throughout the year and applying them in whatever way they need to for these problems*." All tier-one-heavy teachers shared similar experiences that students utilize prior learned strategies of different kinds to solve new problems. They also shared that their tier-one students have a strong memory of fluency facts and search for new challenges while in class. All tier-three-heavy teachers shared that students struggle with memorizing fluency facts. This gap in fluency creates a need for additional focus on foundational skills during instruction. Teachers often balance reinforcing these skills with teaching grade-level content to support student progress.

Lastly, I asked teachers if they think that students met the target of the lesson that was observed. Tier-one-heavy teacher C shared, "*I do feel like the majority of them met that target… since it was about perseverance today and applying the different strategies*." Tier-one students grasp on to grade level content by the end of the lessons. Teacher C also shared that they will move on early if they notice that students understand the topic they are teaching: "I'll just ask them, 'How comfortable do you guys feel about this? How do you feel about taking our assessment early?'" This means that tier-one-heavy teachers focus more on finding content that stretches student thinking rather than filling in gaps.

Alternatively, tier-three-heavy teachers discussed that many of their students still struggle. However, depending on the topic, I received mixed reviews. Tier-three-heavy teacher D said, "at this point in the school year, I would say 45, maybe 50%?" Tier-three-heavy teacher E felt like more students understood their lesson stating, "I would say 85% did when I was walking around. I could tell that I still lost a couple of people and those are normal people." But, teacher E did recognize that some students consistently struggle and did not seem surprised that they were among the few that still struggled.

### Intervention

Intervention in the tier-one-heavy classroom was observed as mainly an extension of the current lesson. Tier-one-heavy teacher C stated, "*I didn't have to do as much reteaching of the concept with that tier-one class*." Instead, tier-one-heavy teachers were able to spend more time in whole group discussion and less time in intervention reviewing concepts. When they did engage in small group intervention, it was mainly a review of the current lesson and addressed any misconceptions that students may have had. None of them mentioned working on filling gaps that were in student learning.

On the other hand, tier-three-heavy classes had much more emphasis on small group intervention (SGI). Tier-three-heavy teacher D shared, "*part of my SGI time, sometimes it is just focusing on the lesson just to try to fill in those gaps that they may have*." During teacher D's lesson, they taught how to divide fractions. However, in their small group, they worked with the students on adding and subtracting fractions with unlike denominators. Adding and subtracting fractions is a prerequisite skill for multiplying and dividing fractions.

The results reveal clear differences in instructional practices, student engagement, and teacher strategies between tier-one-heavy and tier-three-heavy classrooms. Tier-one-heavy classrooms are characterized by student-led learning, minimal scaffolding, and a focus on extending grade-level concepts, reflecting the readiness and fluency of the students. In contrast, tier-three-heavy classrooms emphasize teacher-driven instruction, frequent scaffolding, and targeted interventions to address significant gaps in foundational knowledge. These variations underscore the necessity of adapting teaching methods to meet the unique needs of students in each setting, ensuring all learners have equitable opportunities to succeed academically. By identifying these distinctions, this study highlights the importance of differentiated instruction and the role of foundational skills in shaping effective educational practices.

# CHAPTER FIVE

# CONCLUSION

## Overview

This study investigated the instructional practices, student dynamics, and teacher strategies in tier-one-heavy and tier-three-heavy classrooms, highlighting the stark differences in their approaches to learning and teaching. By examining aspects such as social skills, attendance, family involvement, fluency, scaffolding, and intervention, the study sheds light on the unique challenges faced by both types of classrooms. Tier-one-heavy settings emphasize student independence, collaborative problem-solving, and minimal scaffolding, while tier-three-heavy classrooms prioritize teacher-led instruction, foundational skill-building, and extensive intervention. These contrasts underscore the importance of adapting teaching methods to address the specific needs of students in each setting, ultimately fostering academic growth and equitable learning opportunities for all. The following conclusions summarize these findings and their implications for educators.

## Discussion of Key Findings

When analyzing tier-one-heavy and tier-three-heavy classrooms social skills and behavior, it was observed that teachers of the tier-one-heavy classrooms focused more on student interaction and socialization. The tier-one-heavy classrooms were more student-led; Therefore, they spoke more to the way that students engage in conversation with one another about mathematics. The tier-three-heavy classrooms were more teacher directed which did not allow for opportunities for students to engage in discourse with one another. Referring back to the literature review, Kong and Orosco (2016) discussed the importance of “instructional feedback with peer-assisted learning strategies during instruction” (p. 171). The research showed that peer to peer verbalization is an important part of the learning process, especially for students who are below grade level.

Tier-one-heavy and tier-three-heavy classrooms differ significantly in student attendance and the handling of missed assignments. In tier-one-heavy classrooms. Even when tier-one students miss school, they demonstrate responsibility by completing missed assignments, reflecting a habit of academic accountability. In contrast, tier-three-heavy classrooms face considerable challenges with chronic absenteeism. Tier-three students are less likely to complete missed work, which may exacerbate academic struggles.

The contrasting perspectives on students' home lives showed the differing challenges faced by tier-one-heavy and tier-three-heavy classrooms. While tier-one-heavy teachers had little to say about their students' home situations, tier-three-heavy teachers expressed deep concerns about the hardships their students face outside of school. Issues such as inadequate housing and lack of proper rest reveal the significant barriers that tier-three students must overcome to succeed academically. Battey’s (2013) research discussed the impact of teacher-student interactions in building access to mathematics, especially for low-income Latino and African American students. Having a classroom environment that focuses on the whole child is both beneficial and necessary under all circumstances. These insights highlight the critical role of understanding and addressing the broader context of students' lives in creating equitable and supportive learning environments.

The comparison of family involvement between tier-one-heavy and tier-three-heavy settings reveals stark differences in the level of support students receive at home. Tier-one-heavy teachers consistently reported strong parental involvement, with parents attending school events, engaging in frequent communication with teachers, and actively assisting their children with homework. This high level of support contributes to a more consistent academic experience for tier-one students. In contrast, tier-three-heavy teachers described a more uneven pattern of family involvement. While some parents maintain daily communication with teachers, many are absent from key events like parent-teacher conferences. Additionally, some tier-three students rely on extended family for support, while others receive little to no help at home. These differences emphasize the critical role family involvement plays in shaping students' educational experiences and highlight the unique challenges faced by students in tier-three-heavy settings.

While both tier-one-heavy and tier-three-heavy teachers anticipated student challenges, their focus differed significantly.  Tier-one-heavy teachers primarily anticipated variations in how students might approach the material, focusing on potential strategies and questions, whereas tier-three-heavy teachers anticipated struggles stemming from a lack of foundational mathematical skills, highlighting a critical gap in students' prerequisite knowledge and emphasizing the need for supplemental support to achieve grade-level proficiency. Wood et. al. (1976) discussed enabling learners to build skills or knowledge piece by piece until they can perform the tasks independently. Many of the tier-three-heavy teachers broke the concepts into smaller chunks while the tier-one-heavy teachers were able to cover mathematical concepts as a whole.

While both tier-one-heavy and tier-three-heavy teachers anticipated student challenges, their focus differed significantly. Tier-one-heavy teachers primarily anticipated variations in how students might approach the material, focusing on potential strategies and questions, whereas tier-three-heavy teachers anticipated struggles stemming from a lack of foundational mathematical skills, highlighting a critical gap in students' prerequisite knowledge and emphasizing the need for supplemental support to achieve grade-level proficiency.

The contrasting experiences of tier-one-heavy and tier-three-heavy classrooms highlight the importance of fluency in foundational math facts. In tier-one-heavy settings, students' strong fluency skills enable them to engage with grade-level problems more efficiently and seek out challenges that deepen their understanding. Conversely, in tier-three-heavy classrooms, the lack of fluency significantly impacts students' ability to tackle grade-level work, requiring teachers to dedicate time to foundational skill-building and remediation. This necessity to address missing fundamentals often detracts from time that could be spent on grade-level instruction. These differences underscore the critical role that fluency plays in shaping instructional strategies and the overall learning experience, emphasizing the need for targeted interventions to bridge gaps in foundational skills for tier-three-heavy students.

The differences between tier-one-heavy and tier-three-heavy classrooms in relation to student involvement and discourse. In tier-one-heavy settings, students take a more active, collaborative role in their learning, engaging in discussions and explorations with minimal teacher intervention. This student-led approach fosters deeper connections and independent problem-solving. On the other hand, tier-three-heavy classrooms are more teacher-centered, as students often struggle with confidence and participation in group discussions. Gidalevich and Kramarski's (2019) study compared the difference between fixed scaffolds from the teacher versus fading. The study did show that for teachers who use fading, students performed best. The preference for student-led work among tier-three students highlights potential barriers to peer collaboration, though the exact reasons for their discomfort remain unclear. These contrasting dynamics emphasize the need for differentiated strategies to encourage student engagement and discourse across varying classroom contexts.

The use of scaffolding varies significantly between tier-one-heavy and tier-three-heavy classrooms, reflecting the differing needs of the students. In tier-one-heavy settings, scaffolding is typically minimal, as students often possess the foundational knowledge and skills to navigate lessons independently. Teachers primarily facilitate learning, stepping in to provide support only when students encounter particularly challenging tasks, such as algebra or interpreting complex concepts. This limited use of scaffolding aligns with the overall independence and readiness of tier-one-heavy students.

In contrast, tier-three-heavy classrooms rely heavily on scaffolding to bridge gaps in foundational knowledge and support students' engagement with grade-level content. Teachers frequently integrate strategies such as breaking assignments into smaller, manageable chunks, using manipulatives, and reinforcing basic fluency skills. These approaches aim to make grade-level concepts more accessible for students who may feel overwhelmed or underprepared. However, Broza and Kolikant (2015) shared that scaffolding is more beneficial when it is faded out by the teacher. They recommended that teachers should teach with the scaffold and then take the scaffold away as students' confidence builds. The consistent need for scaffolding in tier-three-heavy classrooms showed the importance of tailored instructional strategies to meet the unique challenges these students face in achieving academic success, but it can also be a hindrance for students to solve complex mathematical problems on their own.

Tier-one-heavy students demonstrate strong memory and the ability to apply previously learned strategies, allowing them to independently tackle new challenges and progress through the curriculum with minimal scaffolding. In comparison, tier-three-heavy students face challenges with fluency and foundational skills, requiring teachers to dedicate instructional time to reinforcing these basics alongside grade-level content. This aligns to the fragile memory of tier-three students that was discussed by Broza and Kolikant (2015) in the literature review. These differences emphasize the importance of tailored instructional approaches to meet the unique needs of students in each tier, ensuring all learners have the opportunity to succeed.

The differences in intervention between tier-one-heavy and tier-three-heavy classrooms highlight the varied instructional priorities based on student needs. In tier-one-heavy classrooms, intervention primarily serves as an extension of the current lesson, focusing on clarifying misconceptions and deepening understanding of grade-level content. Teachers rarely need to address foundational gaps, allowing them to prioritize whole-group discussions and higher-level learning opportunities. Conversely, tier-three-heavy classrooms place a stronger emphasis on small group intervention to address foundational gaps. These interventions often involve reteaching prerequisite skills, such as adding and subtracting fractions, to support students in mastering current grade-level concepts. This contrast underscores the importance of differentiated approaches to intervention, tailored to the specific readiness levels and learning needs of students in each classroom setting.

The findings from this study illustrate the stark contrasts between tier-one-heavy and tier-three-heavy classrooms in terms of instructional practices, student needs, and teacher strategies. While tier-one-heavy classrooms emphasize student-led learning, independence, and advanced problem-solving, tier-three-heavy classrooms focus on foundational skill-building, scaffolding, and teacher-directed interventions. These differences highlight the diverse challenges and opportunities faced by educators in supporting students across varying levels of readiness. By tailoring instruction to meet the specific needs of their students, teachers in both classroom types strive to foster academic growth and engagement. These insights underscore the critical importance of differentiated teaching approaches in creating equitable learning environments that empower all students to achieve success.

## Limitations

There are a few limitations to this comparative case study. First, this was conducted in a single urban school district and in only two schools within the same district. A short amount of time was spent with each participant since I only conducted a single observation and a single interview. Ideally, more prolonged engagement, including an additional observation at different points in the year, would have increased the validity of the study. A short amount of time with participants can be considered a limitation in qualitative research, as it may hinder the ability to establish trust, fully understand the context, and capture the depth of the phenomena being studied. Lincoln and Guba (1985) emphasized the importance of *prolonged engagement* as a key strategy for ensuring the credibility of qualitative research. Prolonged engagement allows researchers to build rapport with participants, understand the culture and context of the study, and identify potential distortions or biases in the data. Without sufficient time in the field, researchers risk collecting superficial or incomplete data, which can compromise the study's trustworthiness and validity.

**Recommendations for Future Research**

Future research after this study may consist of comparing teacher planning among tier-one and tier-three-heavy classrooms. In order to see how much more planning goes into these types of classrooms, it may be fair to compare it to others that are not so tier-three-heavy. Even further research may go into testing out different strategies that may improve student achievement in tier-three-heavy classrooms. For example, a teacher could try whole group intervention five days a week rather than small group intervention each day. With a large number of tier-three-students, it could be questioned if small group interventions are useful.

I believe that we should explore whole group intervention settings and ways to build foundational skills for tier-three students in larger groups. I found consistencies in tier-three students having a fragile memory during this study and I believe it is worth being explored further. Can strengthening tier-three students' memory help with student proficiency? This is something that I think could be next after this base study. Now exploring deeper into the strategies that teachers in tier-three-heavy classrooms use and their effectiveness sounds like a good next step.

## Conclusions

In conclusion, the comparative analysis of tier-one-heavy and tier-three-heavy classrooms reveals distinct differences in instructional practices, student needs, and the challenges teachers face in fostering academic growth. Tier-one-heavy classrooms prioritize student independence, advanced problem-solving, and minimal scaffolding, enabling students to engage deeply with grade-level content. In contrast, tier-three-heavy classrooms require intensive teacher support, scaffolding, and small-group interventions to address foundational gaps in student knowledge. These findings highlight the importance of differentiated teaching strategies that cater to the unique needs of students in each tier. By understanding the specific requirements of tier-one and tier-three students, educators can better tailor their approaches to promote equity and academic success for all learners. Further research into teacher planning, intervention strategies, and student achievement could offer valuable insights into how best to support diverse student populations across varying classroom settings.

APPENDIX A

IRB EXEMPTION

**OAKLAND UNIVERSITY**

**Institutional Review Board**

**Date**: April 22, 2024

**Study #**: IRB-FY2024-311

**Study Tile**: Accessing Grade Level Mathematics Curriculum for Tier Three Heavy Urban Classrooms

**Submission Type**: Initial

**IRB Decision**: Exempt

**Research Team**:
Cassandra Moore
Eileen Johnson

Based on applicable federal regulations, the above referenced study has been determined to be Exempt, with the following categories:
Category 2.(ii). Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) if at least one of the following criteria is met:
Any disclosure of the human subjects' responses outside the research would not reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, educational advancement, or reputation; or

**Notes for Researcher(s):**
This submission includes the following approved documents:

- Recruitment email
- Date-Stamped Consent Form V 4/22/2024
- Interview Questions

**Letter and Consent Document:**
This letter along with the IRB approved (date-stamped) consent document can be found in Cayuse in the Submission Details page under Letters and Attachments, respectively. Please make sure to use the most recent IRB approved version of the consent form in consenting participants.

**Permission from Research Site(s):**
Please note the following:

- This IRB exemption determination letter means that this research has met one or more of the federal criteria for exemption per 45 CFR 46.104- Exempt Research.
- Before the research is initiated, permission to conduct research at a given site must be obtained from all research locations listed in the IRB submission. You must keep copies of all such permission letters for your files.
- It is the responsibility of each researcher to follow all applicable policies and procedures of any outside institution where the research will be conducted.

**Modifications:**
Any changes to this exempt project must be reviewed by the IRB prior to initiation by submitting a MODIFICATION request. Do not collect data while the changes are being reviewed. Data collected during this time cannot be used in research.

**Record Retention:**
Exempt projects will be retained by the IRB office for three years after the last action on the project.

You are approved to start the research. Please retain a copy of this notification for your records.

If you have any questions, please contact the IRB office.

Thank you.

The Oakland University IRB

APPENDIX B

INTERVIEW QUESTIONS

1. Describe your planning process for the lesson that was observed.
2. You have a large number of tier-three/one students. What strategies did you use to ensure that your students were successful with this lesson?
3. Based on the exit ticket and/or informal observation, how many students would you say met the target of this lesson? How many did not?

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