

**ANALYSIS OF SMALL GROUP READING INTERVENTION SUCCESS AT A RURAL  
ELEMENTARY SCHOOL IN PENNSYLVANIA: A CASE STUDY**

by

Kara L. Thorp

Slippery Rock University

A Case Study Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

Slippery Rock University, Slippery Rock, Pennsylvania

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READING INTERVENTIONS

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## READING INTERVENTIONS

**ABSTRACT**

This quantitative quasi-experimental case study examined the effectiveness of two Tier 2 reading intervention strategies—teacher-led small group instruction and an adaptive computer-based program (HMH Waggle)—in improving reading outcomes among sixth-grade students at a rural elementary school in Pennsylvania. The study aimed to address literacy challenges commonly faced in rural settings, such as limited instructional resources, teacher shortages, and underperformance on standardized assessments. Participants included 42 general education students divided into two pre-existing classes: one received small group intervention from the classroom teacher, and the other used the Waggle program. Both groups were assessed using the Measures of Academic Progress (MAP) reading assessment before and after an 18-week intervention period. The study compared growth in three key reading domains: reading informational texts, reading literature, and vocabulary acquisition and use.

Findings indicated no statistically significant differences between groups in reading informational texts or reading literature. However, students who received adaptive online intervention demonstrated significantly greater gains in vocabulary acquisition and use compared to those receiving small group instruction. Grounded in Self-Determination Theory and Vygotsky's Zone of Proximal Development, the study emphasizes the importance of motivation, scaffolding, and differentiated instruction. The findings hold implications for rural educators and policymakers seeking to implement effective, scalable reading interventions tailored to diverse student needs. Recommendations for future research include exploring hybrid models, increasing sample sizes, and examining long-term literacy outcomes.

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### CHAPTER ONE: INTRODUCTION

#### Overview

Reading proficiency is a cornerstone of educational success, yet many students in rural schools continue to struggle with achieving grade-level standards. Recent data underscores this challenge: in 2023, 60.4% of 6th-grade students at a rural Pennsylvania school scored at the basic or below-basic level on the English Language Arts Pennsylvania System of School Assessment (PSSA) exam, a rate significantly higher than the state average of 44.4% (Pennsylvania Department of Education, 2024). This concerning trend underscores the need for effective reading interventions, particularly in rural settings where limited resources and unique demographic challenges can exacerbate disparities in educational outcomes. The purpose of this study is to compare the growth of sixth grade students in a rural school, using small group interventions and an adaptive computer program. The participants in this group are general education students and range from performing below grade level to performing above grade level. Progress will be measured using a diagnostic assessment and comparing growth between the two intervention strategies. By examining their relative effectiveness, the research aims to inform best practices and help educators address the persistent challenges that hinder literacy development in these underserved communities.

#### Background

#### Historical Context

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The history of reading interventions reflects a continuous evolution shaped by educational philosophies, policy changes, and evidence-based methodologies. Early foundational efforts were influenced by Horace Mann in the 19th century, who emphasized the necessity of universal public education to foster an informed and engaged learning experience for children. Mann's vision underscored the importance of structured, accessible instruction for all, setting the stage for later reforms for student success in reading (Eakin, 2000). His work laid the groundwork for a more systematic approach to literacy instruction, ensuring that all children had the opportunity to develop foundational reading skills.

In the late 19th century, the Progressive Education Movement, led by John Dewey, emphasized child-centered learning and experiential education. His beliefs built off Horace Mann's idea of keeping children engaged in their learning. Dewey's philosophy of learning through real-world problem-solving influenced later educational interventions, including reading programs that combined structured phonics with holistic approaches (Hayes, 2015). He emphasized that learning should be student-centered, engaging, and connected to real-world experiences rather than solely focused on rote memorization and skill drills. Progressive educators believed that while essential reading skills—such as phonics, vocabulary, and comprehension—were necessary, they should be taught in ways that encouraged student interest and motivation. Mann and Dewey had a direct impact to American society, particularly in addressing educational disparities and promoting individual and community development.

While individual philosophers made strides in the foundational development of reading interventions, policy makers and educators began working together to find the best practices for reading success in America. By the mid-20th century, structured phonics instruction gained prominence, focusing on the systematic teaching of letter-sound relationships to improve

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decoding and spelling skills. This method addressed the limitations of earlier "look-say" techniques and became a cornerstone for addressing reading challenges, particularly among students with learning difficulties (Nikiforuk, 1993). However, the 1970s and 1980s introduced the whole-language movement, which emphasized natural language acquisition and the joy of reading through exposure to literature. While its intentions were admirable, critics noted that it lacked the structured support necessary for students with limited linguistic exposure (Nikiforuk, 1993).

With a need for this structured support, new interventions systems were created and put into practice, including Reading Wars, whole language instruction, and balanced literacy. A prominent program also developed during this time was the Wilson Reading System, which introduces the idea of breaking reading and spelling down into smaller skills involving letters and sounds and then building on these skills over time. The Wilson Reading System employs a sequential approach to teach decoding and spelling, particularly benefiting students with dyslexia (Education Commission of the States, 1999). This highly structured program gave support to learners with reading disabilities and shifted reading interventions to a more intensive and systematic approach. This shift in reading instruction began the movement to create individualized support to students who exhibited difficulties in reading.

In the early 2000's, government policies continued to make strides in developing more successful literacy programs. Specific initiatives like the No Child Left Behind Act further shaped reading interventions by emphasizing accountability and standardized assessments. No Child Left Behind was created to help the United States close the gaps in achievement, especially targeting these economically disadvantaged areas. No Child Left Behind was initiated to support standards-based education programs, and initiate Title 1 services in disadvantaged school

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districts. The success of No Child Left Behind has been mixed. In a study completed by Dee and Jacob (2011), they revealed that while No Child Left Behind generated improvements in math performance, they found that its impact on reading was more limited. The results from No Child Left Behind highlighted ongoing challenges in implementing broad, effective literacy reforms, and continued to leave America needing to develop successful reading instruction and interventions.

In response to the lack of success with No Child Left Behind in reading development, modern intervention programs have sought to balance foundational skill development. The emergence of balanced literacy models, which integrate phonics-based instruction with authentic reading experiences, reflects an effort to incorporate both explicit skill instruction and meaningful literacy engagement. Additionally, evidence-based intervention frameworks such as Response to Intervention (RTI) and Multi-Tiered Systems of Support (MTSS) have been implemented to provide targeted reading interventions based on student needs. These models recognize that students learn at different paces and require varying levels of support, combining systematic phonics instruction, fluency-building strategies, and comprehension development to ensure long-term reading success (Austin et al., 2019).

Societal impacts continue to propel changes in intervention strategies. With the COVID-19 pandemic, there was a need to change the delivery of teaching due to schools moving to remote learning. Teachers were no longer able to provide interventions in person and needed to switch to online formats. Districts had to rely heavily on online intervention programs that could be utilized at home, and not teacher directed. Teachers could use these online programs to provide to students while they were at home, and the teacher could monitor student progress through the program without seeing them in person. Research showed success in online

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programs that initiated interventions that were adaptive to student progress, and showed that repeated reading interventions, when implemented online, can effectively enhance reading fluency, maintaining consistency with in-person outcomes (Romig & Jetton, 2023). The use of online intervention programs has continued to rise since returning to school after the COVID-19 shut down.

Throughout history, there have been numerous adaptations in reading interventions. These changes include adapting instructions to meet the needs of the students, and instructional techniques used during intervention time. There is a continued focus on adapting to diverse learner needs and integrating technological advancements in reading education. The evolution of reading interventions demonstrates an ongoing commitment to refining educational practices to meet the diverse needs of learners while maintaining a structured yet engaging approach to literacy instruction.

### **Social Context**

Low proficiency scores on Pennsylvania state assessments prove the need for focused literacy strategies, especially in rural schools (PA Department of Education, 2023). These communities face unique literacy challenges due to socioeconomic factors, limited funding, and teacher shortages, exacerbating educational inequities. These factors lead to both teacher and administrator burnout due to the added workload and stress. (Klocko & Justis, 2019). These conditions hinder students' ability to achieve reading proficiency and create obstacles to implementing effective interventions (Rogers, 2023).

Tailored interventions like small group instruction and adaptive online programs have shown promise in addressing these challenges. In a study by Stein et al. (2022), they demonstrate

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that tools such as Lexia and iStation improve reading skills while addressing resource limitations in these underfunded schools. Lexia and iStation are two technology-based reading intervention programs that function as Integrated Learning Systems (ILSs), providing adaptive, computer-assisted instruction to students. These programs are particularly designed to support students at risk for reading deficits by offering individualized, data-driven literacy instruction. Lexia is a cloud-based literacy program that tailors instruction to each student's needs based on an initial assessment and continuous performance monitoring. It is structured around six thematic strands: phonological awareness, phonics, structural analysis, fluency, vocabulary, and comprehension. The program integrates both digital instruction and teacher-guided lessons, making it a blended learning model. iStation is another computer-adaptive literacy intervention program that provides reading instruction through engaging digital content. Like Lexia, iStation begins with a diagnostic assessment that determines the student's starting level, followed by customized lessons that adapt to their progress. The program is built around the five core pillars of reading: phonemic awareness, alphabetic knowledge, fluency, vocabulary, and reading comprehension. iStation also offers supplemental teacher-led lessons for students who struggle with concepts (Stein et al., 2022).

Furthermore, contemporary frameworks such as the Response to Intervention (RTI) model provide a structured approach to literacy instruction by offering tiered support tailored to individual student needs. RTI is a multi-tiered system designed to identify students at risk for reading difficulties early and provide increasingly intensive interventions as needed. Research has shown that students with learning disabilities benefit from targeted, supplemental reading interventions beyond the core curriculum (Austin et al., 2019). These interventions, implemented within RTI frameworks, help to remediate reading difficulties and prevent long-term academic

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failure. The multitiered system of RTI allows educators to implement evidence-based interventions that range from general classroom instruction (Tier 1) to more intensive, personalized interventions (Tier 2 and 3) (Austin et al., 2019). Tier 1 involves high-quality, universal instruction that all students receive. A tiered level of learning emphasizes inclusive teaching practices that aim to prevent learning difficulties from developing in the first place. For students who continue to struggle, Tier 2 provides targeted, small-group interventions that address specific skills, while Tier 3 offers individualized, intensive support (Robinson, 2013). The RTI tiered structure is beneficial in rural schools, has been proven in multiple studies that teachers need to manage diverse student abilities within a single classroom and cannot always rely on specialized staff for additional support (Austin et al., 2019; Robinson, 2013). This model has been particularly effective in rural settings, where its flexibility allows for maximizing limited resources and fostering collaboration among educators (Capin et al., 2024). RTI fosters collaboration and is a flexible model of providing interventions for students and meeting their needs. The RTI model can be an effective intervention strategy to meet the needs of struggling readers in rural areas.

This overview reveals that literacy interventions are not only tools for academic success but also vehicles for societal advancement. By addressing systemic inequities and adapting to diverse learner needs, reading interventions continue to play a critical role in fostering equity and opportunity within educational systems and broader society.

### **Theoretical Context**

The present study focused on reading interventions at a rural elementary school in the form of small group and adaptive computer software. The use of these interventions is supported by two primary theoretical frameworks: Self-Determination Theory (SDT), and Zone of

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Proximal Development (ZPD). Both theories provide insights into the motivation and cognitive processes driving learning for students and will help support the research question of which intervention provides the most reading success to students attending rural schools.

Self-Determination Theory (SDT) was developed by Deci and Ryan, and the theory explores the psychological needs of competence, autonomy, and relatedness, which are critical for fostering intrinsic motivation (Ryan & Deci, 2000). In educational settings, SDT emphasizes the importance of creating environments that promote student choice, provide feedback to enhance competence, and foster meaningful social interactions to satisfy relatedness needs (Stone, Deci, & Ryan, 2009). Self-Determination Theory (SDT) provides a valuable framework for understanding how reading interventions can be designed to enhance student motivation, engagement, and long-term success in literacy development. When these needs are met, individuals are more likely to be intrinsically motivated, persist in learning, and achieve higher levels of engagement. Applying SDT to reading interventions helps educators create environments that not only address cognitive skill development but also foster the motivation necessary for sustained reading progress. Throughout this study, the teacher will work to create an environment to inspire intrinsic motivation during intervention time that includes meaningful engagement for students and providing purpose-driven reading activities.

The second theory to support the study is Zone of Proximal Development (ZPD). This theory was developed by Lev Vygotsky and describes the space between what a learner can accomplish independently and what they can achieve with guidance or collaboration (Doolittle, 1995). ZPD emphasizes the importance of scaffolding, where educators provide targeted support to help students progress through tasks just beyond their current ability (Clapper, 2015). This framework is highly relevant to this study's focus on teacher-led small group instruction, as it

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supports differentiated strategies tailored to individual students' learning needs and using online programs that are tailored to each student's specific needs. For example, the researcher will use data from a diagnostic assessment to place students in groups with peers functioning on the same reading level. The researcher will adapt the small groups to meet the needs in areas that need improvement based on assessment results. Students who are using the online program for intervention will receive an individualized instruction plan that will adapt the program to meet their needs, based on their progress within the program. Research suggests that scaffolding within the ZPD helps students internalize knowledge and skills, enabling them to achieve greater independence over time (Silalahi, 2019).

In summary, this study is aimed to compare the success of sixth grade students in rural schools when receiving Tier 2 reading interventions in small group, compared to students receiving Tier 2 interventions using an adaptive computer program.

### **Problem Statement**

Rural schools face a multitude of issues, including lack of funding, teacher shortages, and a lack of technology access (Rogers, 2023; Klocko & Justis, 2019). Studies show a variety of results between the success of using online reading intervention programs and the success of using small group reading interventions for students in rural schools (Stein et al., 2022; Donegan & Wanzek, 2021). There is no concrete research that has been done comparing the intervention types for students who attend these rural schools. My research aims to see which reading intervention type works best with this population.

This study is focused on sixth grade students at a rural elementary school in Pennsylvania consistently averaging below average performance on English Language Arts Pennsylvania System of School Assessment (PSSA) tests and continue to score under the state average,

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according to the PSSA results. The school has consistently been below the state average over the last five years (Pennsylvania Department of Education, 2023). In 2023, 60.4% of 6<sup>th</sup> grade students at a rural school in Pennsylvania scored either basic or below basic on the ELA PSSA exam (Pennsylvania Department of Education, 2023). The school average is larger than the state average of 44.4% of students scoring basic or below basic, showing the need for targeted interventions. A change needs to occur within the district to help increase reading achievement among students who attend this rural school.

### **Purpose Statement**

The purpose of this quantitative quasi-experimental case study was to analyze and compare reading intervention outcomes among two classes of 6<sup>th</sup> grade students in a rural school. 6<sup>th</sup> grade general education students in a rural school were chosen to complete the study. Students were in two classes, taught by the researcher. Students received instruction using the Into Reading curriculum in whole group and received intervention time in a small group. One of the classes receiving online intervention with the online program Waggle served as the control group, while the second class receiving small group intervention led by the general education teacher served as the experimental group. The intervention groups were the independent variable. Reading success was measured by performance in the pre- and post-test, which was performed using the Measure of Academic Progress (MAPs) assessment. The MAP assessment served as the dependent variable. At the end of the experiment, the average increase in the MAPs assessment was compared to show which group had more growth over the course of 18 weeks.

### **Significance of the Study**

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The study on reading interventions is significant because it addresses the pressing issue of literacy disparities in rural schools and contributes to a broader understanding of effective educational practices. Reading proficiency is a critical factor in academic success and societal participation, yet rural schools often face unique challenges, such as limited funding, teacher shortages, and high poverty rates, which hinder students' ability to achieve proficiency. Online interventions can begin to target the needs of students, helping resolve the challenges.

The findings from this research will contribute both theoretically and empirically to the field of reading interventions. By comparing the outcomes of small-group instruction and adaptive computer-based programs, the study aims to identify the most effective strategies for improving literacy outcomes in underserved rural settings. Studies from numerous researchers, including Donegan and Wanzek (2021) have shown that small-group instruction offers targeted and individualized support, enhancing reading comprehension and fluency. In contrast, technology-based interventions, such as Lexia and iStation, have demonstrated efficiency and adaptability in addressing the resource constraints typical of rural schools (Stein et al., 2022).

This research also holds broader societal implications. Addressing literacy disparities in rural areas contributes to narrowing educational gaps, fostering community development, and preparing students for active societal participation. The application of frameworks like the Response to Intervention model provides scalable and evidence-based approaches to literacy instruction, promoting equity in education systems (Kehoe & McGinty, 2023). Moreover, the study's insights can inform educational policy and practice, supporting the development of tailored interventions that accommodate the unique needs of rural learners.

In summary, this study is important not only for its potential to enhance literacy outcomes in a specific rural district but also for its contributions to the broader knowledge base on effective

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reading interventions. It emphasizes the need for innovative and adaptable strategies that address systemic inequities and prepare students for lifelong learning and civic engagement.

### Research Questions

**RQ1:** Which intervention showed the most significant growth in reading informational texts on the MAPs assessment?

**RQ2:** Which intervention showed the most significant growth in reading literature on the MAPs assessment?

**RQ3:** Which intervention showed the most significant growth in vocabulary acquisition and use on the MAPs assessment?

### Definitions

1. *Adaptive Computer-Based Intervention Programs*- programs and resources that are accessed online and designed to help readers improve their literacy skills and accelerate learning. These programs adapt their activities based on student performance to meet the needs the student is showing. (Cleaver, 2023).
2. *Waggle*- an adaptive computer-based program for Grades K–8 delivers adaptive, personalized practice and instruction for students at all proficiency levels (HMH, 2022).
3. *Small Group Reading Interventions*- a type of differentiated instruction that involves grouping three to five students based on their learning needs and other factors (Corujo, 2024).

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### Chapter 2: Review of Literature

#### Overview

The purpose of this study is to analyze and provide teachers with the most effective reading intervention strategies to improve the practice of reading instruction in to improve reading proficiency in 6<sup>th</sup> grade students in a rural school in Pennsylvania, comparing two intervention strategies. 6<sup>th</sup>-grade students at the target school struggled to maintain proficient reading scores on Pennsylvania System of School Assessment (PSSA) tests and continue to score under the state average, according to the PSSA results (Pennsylvania Department of Education, 2024). The Literature Review presents the Theoretical Framework, Literature Review, and the Summary of Findings.

#### Theoretical Framework

A systematic review of the literature was conducted to deepen understanding of using Tier 2 interventions with 6<sup>th</sup> grade students at a rural elementary school in Pennsylvania. This chapter provides theories to support the logistics behind Tier 2 interventions that are offered during this study, along with theories to support why they are effective. Theories that are analyzed are self-determination theory and zone of proximal development theory.

This study compares the success of sixth grade students when receiving Tier 2 reading interventions in small group, compared to students receiving Tier 2 interventions using an adaptive computer program. Both of these theories support the use of Tier 2 interventions, regardless of format.

#### Self-Determination Theory

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Deci and Ryan's self-determination theory (SDT) is a prominent psychological framework explaining human motivation and well-being. Self-determination theory is an approach to human motivation and personality that uses traditional empirical methods while employing an organismic metatheory that highlights the importance of humans' evolved inner resources for personality development and behavioral self-regulation (Deci and Ryan, 2000). They believe that humans are inherently motivated to grow and engage in uninteresting tasks when their meaning and value is understood (Deci and Ryan, 2000).

According to SDT, humans have three core psychological needs: competence, relatedness, and autonomy. Competence is the belief that one can influence important outcomes. Relatedness is the experience of having satisfied and supportive social relationships. Autonomy concerns the experience of acting with a sense of choice, volition, and self-determination (Stone, Deci, and Ryan, 2009).

In the context of education, SDT emphasizes creating learning environments that foster intrinsic motivation by supporting needs, leading to more engaged, persistent, and self-motivated learners. Contexts yield autonomous regulation if they are autonomy supportive, thus allowing the person to feel competent, related, and autonomous. This will instill the highest level of motivation (Stone, Deci, and Ryan, 2009). When students experience autonomy and are provided opportunities to feel competent and connected, they are more likely to develop a sustained love for learning. This is especially important to this study due to the population of students attending the target school. In this rural district, 64.5% of the students enrolled are reported to be economically disadvantaged (PA Ready Index, 2024). Additionally, a large percentage of students are being raised by adults who are not their biological parents. This can lead to inconsistency at home with these students and can equate to low morale in school. As a teacher

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in a rural district, the responsibility to inspire intrinsic motivation is vital for student success. The researcher in this study had to ensure that they were making strides to build relationships with their students to gain their trust and provide instruction/activities that allow the students to be successful to help build this intrinsic motivation. Students who feel successful in the classroom and respected by the teacher are more likely to work harder and develop that drive to success for themselves when in an environment that promotes success.

Deci and Ryan's Self-Determination Theory (SDT) provides a strong theoretical foundation for the effectiveness of Tier 2 reading interventions, both in small-group settings and online programs. SDT emphasizes that learners are intrinsically motivated when their psychological needs for competence, relatedness, and autonomy are met (Deci & Ryan, 2000). In Tier 2 interventions, whether conducted in small groups or through online adaptive programs, these needs can be intentionally supported to enhance student engagement, persistence, and literacy growth.

### **Zone of Proximal Development (ZPD) Theory**

Vygotsky's zone of proximal development theory (ZPD) describes the gap between what a learner can accomplish independently and what they can achieve with guidance or collaboration. ZPD theory emphasizes the importance of scaffolding, where a more knowledgeable individual (such as a teacher or peer) provides support to help the learner progress through tasks they could not complete alone (Clapper, 2015). Furthermore, the region of immediate potential for cognitive growth is the zone of proximal development (Doolittle, 1995).

In education, ZPD is the idea that optimal learning occurs just beyond the learner's current ability, where support from educators or peers is most effective. Children internalize the knowledge and skills from interactions with their peers or educators and eventually use them to

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guide and direct their own behavior (Doolittle, 1995). ZPD framework supports differentiated instruction, ensuring that students are appropriately challenged and receive the guidance necessary to build their competence. A facilitator can oversee the learning process and when faced with a challenge, can use techniques such as demonstration, discussion, and real-life examples to help solve the problems (Clapper, 2015). It also promotes the use of social interaction as a vital part of the learning process, aligning with collaborative learning practices in classrooms.

Vygotsky's theory is particularly relevant in interventions such as reading instruction, where teachers tailor support based on individual students' needs to help them progress from current capabilities toward higher proficiency. ZPD can be supported in putting students into small groups based on ability levels, and explicitly teaching skills based on the level that they are at. ZPD can also be met by utilizing computer programs that are adaptive to student needs and are constantly analyzing student success in the program and then creating interventions at their skill level. Zone of proximal development suggests that the child is immersed in a cooperative activity within a specific learning environment (Doolittle, 1995). ZPD is all about learning and development, and the learning should be targeted at the student's potential development, not actual development (Silalahi, 2019). The ZPD provides a basis for understanding how students can advance with structured assistance, making it a valuable framework for designing instructional strategies that push learners toward independent mastery.

### **Related Literature**

The purpose of this literature review is to understand current research that would support best practices for intervention techniques to improve student success in reading in rural schools.

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Research includes challenges rural schools face, preparing teachers to be successful in rural environments, and intervention strategies to promote reading success.

### **Teacher-Led Small Group Interventions**

#### *Rationale of Teacher-Led Small Group Interventions*

Teacher-led small group interventions play a crucial role within the Response to Intervention (RTI) framework by providing targeted instruction to struggling readers. RTI is a tiered system designed to identify and support students with learning difficulties, and small-group instruction is a critical component, particularly in Tier 2 interventions (Austin et al., 2019). One of the central benefits of the RTI model in rural schools is its adaptability. The multitiered system allows educators to implement evidence-based interventions that range from general classroom instruction (Tier 1) to more intensive, personalized interventions (Tier 2 and 3) (Austin et al., 2019). Tier 1 involves high-quality, universal instruction that all students receive. A Tiered level of learning emphasizes inclusive teaching practices that aim to prevent learning difficulties from developing in the first place. For students who continue to struggle, Tier 2 provides targeted, small-group interventions that address specific skills, while Tier 3 offers individualized, intensive support (Robinson, 2013). The RTI tiered structure is beneficial in rural schools, has been proven in multiple studies that teachers need to manage diverse student abilities within a single classroom and cannot always rely on specialized staff for additional support (Austin et al., 2019; Robinson, 2013).

Small-group instruction allows educators to personalize learning experiences, addressing students' specific academic needs while fostering deeper engagement. This approach is especially beneficial in rural schools, where teachers often manage diverse student needs with limited instructional resources (Batista, 2019).

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The benefits of personalized, face-to-face instruction are well-documented. Research has shown that small-group interventions allow students to receive more immediate feedback, participate in interactive discussions, and engage with material in a structured manner (Donegan & Wanzek, 2021). These interventions support foundational reading skills, including phonemic awareness, fluency, decoding, and comprehension, which are critical for literacy development. In rural schools, where specialized support such as reading specialists is often unavailable, teacher-led small groups provide an effective means of delivering evidence-based instruction (Robinson, 2013).

### *Evidence of Effectiveness*

Implementing RTI in rural schools has shown promising results in addressing the educational needs of diverse learners. One of the key factors contributing to the success of RTI is its structured, tiered approach, which allows educators to provide varying levels of support tailored to individual student needs (Capin et al., 2024). The flexibility of RTI is particularly beneficial in rural settings, where resources are often scarce. RTI helps rural schools by offering targeted interventions. Targeted interventions will maximize the impact of limited resources, leading to improved student outcomes. The multitiered level of support that RTI offers also ensures that students receive the appropriate amount of support, ranging from universal instruction through Tier 1 to more intensive interventions at Tier 2 or Tier 3 levels, depending on student needs (Robinson et al., 2013).

Research indicates that RTI can significantly improve core academic areas, particularly reading (Capin et al., 2024). When students receive Tier 2 interventions, they get small groups, targeted instruction to meet their needs. Tier 2 interventions are effective in improving reading fluency and comprehension among at-risk students in reading. A study showed that second

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graders who received Tier 2 interventions during disruptions caused by COVID-19 demonstrated significant gains in reading skills (Cadime et al., 2022). Data that was collected through studies shows adaptability through the RTI framework and the ability to provide structured support regardless of educational setting. Early, targeted instruction within a Multitiered System of Support (MTSS) framework, which aligns with RTI principles, helped mitigate long-term academic difficulties, underscoring the importance of early intervention (Coyne et al., 2018).

Numerous studies highlight the effectiveness of small group reading interventions in improving literacy outcomes. A review of small group reading interventions found that groups of two to five students achieved significantly greater gains in reading comprehension and skills than larger groups (Donegan & Wanzek, 2021). Focused attention in small settings enables educators to tailor instruction, reinforcing essential reading strategies such as decoding, fluency, and comprehension (Opatz & Kocherhans, 2023).

Furthermore, explicit instruction within small-group interventions has been shown to enhance both word recognition and reading fluency (Solari et al., 2018). Research also suggests that structured Tier 2 interventions that integrate multiple components—such as phonics, fluency, and comprehension—yield better results than those that address skills in isolation (Opatz & Kocherhans, 2023). These findings support the integration of teacher-led small-group instruction as a key element of RTI implementation, particularly in rural schools where students may lack additional literacy support.

While small-group interventions have proven effective, some studies indicate that their success depends on consistent implementation and alignment with Tier 1 instruction. For example, research found that small-group interventions improved vocabulary and content knowledge but had less impact on overall reading comprehension (Stevens et al., 2020). This

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suggests that a systematic approach, in which small-group interventions complement whole-class instruction, is essential for maximizing student gains.

### *Challenges & Considerations*

Despite their effectiveness, implementing teacher-led small-group interventions in rural schools presents several challenges. The RTI framework in rural schools is only successful when evidence-based instructional strategies are effectively integrated. A systematic review was conducted to highlight the effectiveness of small-group interventions within the RTI framework (Dietrichson et al., 2020). They found that small-group interventions allow for more significant interaction among students and teachers and individualized attention, which have shown success in rural schools where students could otherwise lack access to those specialized resources. Studies show that success of RTI interventions depends on selecting strategies that align with rural students' specific needs and contexts. Along with using effective evidence-based practices, another component that affects the success of RTI implementation is continuous progress monitoring and adjusting interventions when needed. Van Norman et al. (2020) explored the profiles of students exiting Tier 2 interventions. At the same time, many showed progress; those with lower initial skills required ongoing, sustained support to maintain their gains. Their research highlights how crucial regular progress monitoring is and that rural schools need to be flexible in their approach to RTI implementation, which involves assessing students and analyzing data frequently. Frequent assessments will identify which interventions the students benefit from and point out students who might need additional or alternative support (Van Norman et al., 2022).

Another significant issue is staffing shortages, which limit the availability of educators to provide individualized support (Goldhaber et al., 2020). Rural schools often face difficulties in

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recruiting and retaining qualified teachers, leading to increased workloads and limited opportunities for small-group instruction (Vaughn & Fletcher, 2012). When schools lack adequate personnel, interventions may be inconsistently applied, reducing their overall effectiveness.

Limited resources also hinder the successful implementation of small-group interventions in rural settings. Rural schools often struggle with inadequate funding, making it difficult to provide essential instructional materials, technology, and progress monitoring tools (Shenoy et al., 2024). Additionally, teachers may not receive sufficient professional development on how to implement evidence-based reading interventions effectively (Kehoe & McGinty, 2023). Without ongoing training, educators may struggle to adapt instruction to meet the diverse needs of struggling readers.

To address these challenges, schools must invest in professional development and support systems that equip teachers with the necessary skills and knowledge to implement small-group interventions effectively. Programs such as Targeted Reading Instruction (TRI) have demonstrated success by providing structured coaching sessions and real-time feedback to educators, enhancing their ability to deliver effective literacy instruction (Aiken et al., 2021). Additionally, instructional coaches can offer continuous support, ensuring that teachers apply research-based strategies consistently in small-group settings (Amendum & Liebfreund, 2018).

Consistent progress monitoring is another critical component for ensuring the success of small-group interventions. Rural schools must develop systematic data collection processes to track student progress and adjust interventions as needed (Van Norman et al., 2020). Combining quantitative assessments, such as fluency and comprehension tests, with qualitative observations

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can help educators refine instructional strategies and ensure that interventions are meeting students' needs (Hoover, 2011).

Ultimately, the success of teacher-led small-group interventions in rural schools depends on careful planning, professional development, and strategic resource allocation. By addressing staffing shortages, enhancing professional training, and implementing robust progress monitoring systems, rural schools can overcome barriers and improve literacy outcomes for struggling readers.

### **Online and Technology-Based Reading Interventions**

#### ***Introduction to Integrated Learning Systems***

Implementing reading interventions in rural schools can be challenging. Different approaches have shown varying degrees of success. Rural schools have found success in implementing integrated learning systems, which are computer-based instructional programs designed to provide individualized learning experiences for students. They typically involve a one-to-one student-to-computer setup, where lessons adapt to each student's performance by adjusting the difficulty level or repeating lessons as needed (Stein et al., 2022). Using online interventions benefits rural schools due to scarce resources and a need for more funds.

Integrated learning systems, such as Lexia and iStation, offer computer-based instructional models that provide individualized learning experiences for students. A study compared two integrated learning systems in a rural setting, Lexia and iStation, and found that both programs effectively supported reading development, with Lexia showing advantages regarding instructional efficiency (Stein et al., 2022). Lexia's adaptive learning model allowed for individualized instruction, enabling students to progress independently. The adaptive learning model takes student progress in the program and adapts it to meet the needs of each individual

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student. These models were particularly beneficial in rural schools where staffing shortages face the challenge to offer consistent one-on-one support (Stein et al., 2022). However, the study also noted that while Lexia and iStation facilitated comparable improvements in reading skills, Lexia required less staff time to implement, making the online program more efficient for rural settings with limited personnel.

One of the primary advantages of integrated learning systems is their ability to reduce teacher workload while maintaining instructional quality. Traditional pull-out intervention programs (a widely used reading intervention strategy in which students who require additional literacy support are temporarily removed from the general education classroom for targeted, small-group instruction) require trained interventionists, which can be difficult to sustain in rural areas due to budget constraints and staffing shortages (Ingersoll & Tran, 2023). In contrast, online programs provide structured, data-driven instruction that allows students to work independently while teachers monitor progress and provide supplementary support when necessary (Szili et al., 2022). By leveraging technology-based interventions, rural schools can address resource limitations while ensuring students receive high-quality, individualized literacy instruction.

### *Adaptive Learning & Game-Based Interventions*

Adaptive learning systems and game-based interventions provide personalized instruction while enhancing student engagement and motivation. Adaptive programs continuously adjust their content based on student performance, allowing learners to receive instruction at an appropriate difficulty level. Research on fifth-grade students using adaptive reading programs found significant improvements in vocabulary, comprehension, and overall reading achievement,

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demonstrating the potential of personalized learning models to support struggling readers (Campbell et al., 2022).

Game-based interventions have also gained traction as effective tools for literacy instruction. Digital programs such as *Missions with Monty* integrate strategy-based reading instruction with interactive elements that maintain student motivation (Syal & Nietfeld, 2024). Studies have shown that students using game-based reading interventions exhibit higher comprehension gains and increased intrinsic motivation compared to those using traditional online programs (Syal & Nietfeld, 2024). This approach is particularly useful in rural settings, where students may have limited access to extracurricular activities and external literacy support. However, research suggests that engagement levels significantly impact the success of game-based interventions. While programs like GraphoLearn have effectively enhanced phonemic awareness and letter-sound correspondence, some studies indicate that long-term engagement declines without additional motivational elements, such as reward systems or progress tracking (Ronimus et al., 2019). These findings highlight the need for educational game developers to incorporate sustained engagement strategies to maximize student learning outcomes.

### ***Evidence of Effectiveness***

Several studies have demonstrated the effectiveness of computer-based reading interventions in improving literacy skills. Research comparing Lexia and iStation in rural schools found that both programs successfully supported reading development, with Lexia requiring less staff time and offering greater instructional efficiency (Stein et al., 2022). Additionally, a study researching the programs Funnix and Headsprout revealed that these computer-based programs significantly improved phonemic awareness and vocabulary among at-risk students when implemented in after-school tutoring sessions (Pindiprolu & Forbush, 2021).

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Another study evaluating a web-based reading comprehension program in rural and high-poverty schools found that students using the digital intervention outperformed their peers in identifying main ideas and summarization tasks (Wijekumar et al., 2024). These improvements were particularly evident in researcher-designed assessments, suggesting that technology-based interventions can effectively teach specific literacy strategies. However, the study also indicated that gains on standardized tests were less pronounced, emphasizing the need for careful consideration of assessment methods when evaluating program success.

Despite the positive impact of online interventions, some research has yielded mixed results. A study on the GraphoLearn mobile app found that while the program improved letter-sound correspondence and word reading fluency, it had a limited effect on broader reading comprehension skills (Ronimus et al., 2020). This suggests that while digital interventions can effectively build foundational reading skills, their success depends on integration with broader literacy instruction.

### *Implementation Challenges*

While technology-based reading interventions offer promising solutions for rural schools, several challenges must be addressed to ensure successful implementation. One major issue is internet connectivity. Many rural communities experience unreliable internet access, which can hinder students' ability to consistently engage with online learning platforms (Pindiprolu & Forbush, 2021). Additionally, some schools may lack sufficient devices to provide equitable access to technology-based interventions, further limiting their effectiveness.

Another significant challenge is staff training. Teachers must be equipped with the knowledge and skills to integrate online programs effectively into their curricula. Studies indicate that schools that provide structured professional development see better outcomes in

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technology-based interventions (Wijekumar et al., 2024). However, rural schools often face funding and staffing shortages that make it difficult to offer comprehensive training programs (Ingersoll & Tran, 2023). Without proper training, teachers may struggle to implement digital interventions effectively, reducing their impact on student learning.

Furthermore, online reading programs require consistent monitoring and oversight to ensure instructional depth. While adaptive programs are designed to adjust based on student performance, research suggests that teacher intervention is still necessary to guide instruction and analyze student progress data (Pindiprolu & Forbush, 2021). In rural schools with limited staff, maintaining regular monitoring of online interventions can be challenging, potentially reducing their effectiveness.

Online and technology-based reading interventions provide valuable opportunities to support literacy development in rural schools. Adaptive learning systems such as Lexia and iStation offer personalized instruction while reducing teacher workload, and game-based programs enhance engagement and motivation. Research demonstrates that digital interventions can significantly improve reading outcomes, particularly for at-risk students. However, successful implementation requires addressing challenges such as internet connectivity, staff training, and program integration into existing curricula. By strategically planning for these challenges, rural schools can maximize the benefits of technology-based literacy interventions and enhance student achievement.

### **Comparative Analysis of Teacher-Led vs. Online Interventions**

#### ***Outcome Comparisons***

Teacher-led and online reading interventions each offer unique benefits and challenges in addressing literacy gaps, particularly in rural settings. Studies indicate that both intervention

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models improve reading achievement, though their effectiveness varies depending on implementation fidelity, student engagement, and resource availability (Stein et al., 2022; Szili et al., 2022).

Teacher-led interventions, such as small-group instruction within the Response to Intervention (RTI) framework, have demonstrated success in developing foundational literacy skills, particularly in phonemic awareness, fluency, and comprehension (Cadime et al., 2022). Research suggests that small groups of two to five students show more significant gains in reading comprehension than larger groups due to increased interaction with instructors and targeted instruction (Donegan & Wanzek, 2021). However, challenges such as staffing shortages and high teacher workloads can limit the effectiveness of these interventions in rural schools (Goldhaber et al., 2020).

Conversely, online interventions offer flexibility and scalability, making them a viable solution for rural schools facing resource constraints. Programs such as Lexia and iStation provide adaptive learning experiences that adjust to student progress, reducing the need for direct teacher involvement while maintaining instructional quality (Stein et al., 2022). Research comparing these systems found that both improved reading skills, with Lexia being particularly efficient in terms of instructional time (Stein et al., 2022). Additionally, game-based interventions, such as *Missions with Monty*, have been shown to enhance student motivation and engagement, which are critical factors in literacy development (Syal & Nietfeld, 2024).

While both models yield improvements, teacher-led interventions often produce deeper learning due to the personalized support students receive. However, online programs provide consistent, self-paced instruction, which can be particularly beneficial for students who lack access to in-person tutoring.

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### *Advantages & Disadvantages*

Teacher-led interventions provide several advantages, particularly in their ability to offer personalized instruction tailored to individual student needs (Cadime et al., 2022). With direct, face-to-face interaction, educators can adjust instruction in real-time based on student responses, ensuring that struggling readers receive immediate feedback and targeted support (Donegan & Wanzek, 2021). Additionally, strong student-teacher relationships in teacher-led models have been linked to increased engagement and academic motivation, fostering a supportive learning environment for students (Robinson, 2013). However, the success of teacher-led interventions is often limited by time and staffing constraints, particularly in rural areas where teacher shortages are prevalent (Goldhaber et al., 2020). Delivering small-group interventions requires substantial resources, and schools with limited personnel may struggle to provide consistent, high-quality instruction. Furthermore, the effectiveness of these interventions depends on teacher expertise, and many rural educators lack access to professional development that would allow them to implement evidence-based strategies effectively (Kehoe & McGinty, 2023). Because teacher-led interventions require a significant investment of time and effort, they may not always be scalable in districts with limited instructional staff (Shenoy et al., 2024).

In contrast, online interventions offer the advantage of adaptive learning, ensuring that instruction is tailored to student needs while minimizing the demand for direct teacher oversight (Stein et al., 2022). These programs can reduce teacher workload by automating lesson delivery and progress tracking, allowing educators to allocate their time more efficiently (Szili et al., 2022). Additionally, online programs are easily scalable, making them a practical solution for rural schools with limited staff but many students needing intervention (Pindiprolu & Forbush, 2021). Digital tools, particularly those with game-based elements, can enhance student

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engagement and motivation, which is critical for struggling readers (Ronimus et al., 2020; Syal & Nietfeld, 2024). Despite these advantages, online interventions also present challenges. Reliable internet access and sufficient technology infrastructure are necessary for successful implementation, and many rural schools struggle with connectivity issues (Pindiprolu & Forbush, 2021). Additionally, the effectiveness of online programs depends on student motivation and engagement—while some students thrive in digital learning environments, others may disengage without direct oversight (Ronimus et al., 2019). Moreover, teacher involvement remains necessary to monitor progress and ensure that students receive adequate support, meaning that online interventions cannot fully replace human instruction (Wijekumar et al., 2024).

### *Implications for Rural Settings*

There can be significant stress faced by rural school principals, who often need more resources to juggle multiple responsibilities. Rural principals can feel isolated due to small districts' need for more administrative staff (Rogers, 2023). The added responsibility can affect their ability to manage tasks effectively, which contributes to a high stress level for rural school principals and, in turn, impacts their effectiveness in leading their schools (Klocko & Justis, 2019).

In rural areas, schools also suffer from teacher shortages. The teacher shortage issue is highlighted by multiple researchers who note that rural schools often need more staff than in urban areas (Rogers, 2023; Goldhaber et al., 2020). Factors that affect teacher shortages include low salaries and challenging working conditions, which make attracting and retaining qualified teachers to their district more difficult. The reliance on emergency-certified and long-term substitute teachers can diminish educational quality (Goldhaber et al., 2020).

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Rural schools face a unique set of challenges that stem from geographic isolation, socio-economic factors, and teacher shortages, all of which impact the quality of education and student support services. Many families in rural communities are classified as low-income, which can limit access to educational resources and contribute to disparities in student achievement. At the same time, the geographic spread of rural schools makes collaboration between districts difficult, further isolating educators and reducing opportunities for shared resources and professional development (Klocko & Justis, 2019). These factors are compounded by persistent teacher shortages, which create significant barriers to recruiting and retaining qualified educators in rural areas (Goldhaber et al., 2020). As a result, school leaders struggle to provide essential services to students due to low staffing levels, limiting the availability of intervention groups and supplemental instruction for struggling learners (Rogers, 2023). All these issues create a combination of challenges for staff to provide adequate reading interventions to meet the needs of their students.

Rural school districts frequently experience lower funding due to their smaller size and reliance on local tax bases, which significantly affects their ability to provide essential educational resources (Rogers, 2023). Limited financing restricts access to updated instructional materials, competitive teacher salaries, and necessary student support services, impacting overall student success. Beyond classroom instruction, insufficient funding also affects facility maintenance, transportation, and access to mental health services, which are crucial for fostering a supportive learning environment (Klocko & Justis, 2019).

Moreover, rural schools face unique financial challenges due to lower enrollment numbers and a reduced property tax base, which serve as critical sources of local district funding. As a result, these schools often struggle to afford intervention programs, specialized reading

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curricula, and professional development for teachers, limiting their ability to address literacy challenges effectively (Klocko & Justis, 2019). Additionally, high transportation costs in rural areas further strain budgets, reducing funds available for instructional improvements (Rogers, 2023).

Trying to find a balance between raising local school taxes and the high poverty rate in rural communities makes it extremely difficult for administrators to decide what materials are necessary for student success in the classroom (Klocko & Justis, 2019). High poverty rates can also affect early education before kindergarten. Within rural areas, there is typically limited access to early care and education for children. The limit on access to early care and education for children which can contribute to school readiness when children in rural areas are at an age to attend kindergarten (Morrissey et al., 2020). Public early care and education programs are critical in supporting children coming from low-income families. Rural areas often need more funding for early childhood programs, which leads to lower participation in high-quality early care programs. Children start kindergarten without prior education experience, leading to a lack of foundational knowledge (Morrissey et al, 2020). Along with a lack of access to resources within the schools, students are limited to mental health services within rural areas. The shortage of mental health providers, combined with the stigma surrounding mental health issues, makes it even more difficult for individuals to access essential services. To address this challenge, innovative solutions like placing mental health counselors in schools have been proposed (Smith et al., 2023).

The prevailing "one size fits all" approach to educational policy often overlooks the specific needs of rural schools. Policymakers must advocate for tailored policies that address the

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unique challenges faced by rural communities, emphasizing the importance of local input in policy formulation to create practical solutions (Klocko & Justis, 2019; Rogers, 2023).

The choice between teacher-led and online interventions has significant implications for rural education, where schools must balance effectiveness with cost, scalability, and sustainability.

Teacher-led interventions address the individualized learning needs of students but require substantial staffing and training. Given the persistent teacher shortages and funding limitations in rural areas, these interventions can be challenging to maintain at scale (Rogers, 2023; Goldhaber et al., 2020). Additionally, rural educators often juggle multiple responsibilities, making it difficult to allocate sufficient time for small-group instruction (Klocko & Justis, 2019).

Online interventions provide a cost-effective alternative that allows rural schools to deliver consistent instruction without requiring additional personnel (Stein et al., 2022). However, access to technology and internet connectivity remains a barrier in many rural communities, limiting the effectiveness of digital programs (Pindiprolu & Forbush, 2021).

### ***Cost, Scalability, and Sustainability Considerations***

The cost of implementing reading interventions is a critical factor for rural schools. Teacher-led interventions require ongoing investments in teacher salaries, training, and instructional materials, which can strain already-limited school budgets (Kehoe & McGinty, 2023). In contrast, online programs involve initial technology costs and annual subscription fees, but they reduce long-term staffing expenses by automating certain aspects of instruction (Stein et al., 2022). While technology-based programs may require an upfront investment, they can

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provide cost savings in the long run, particularly in districts that struggle to recruit and retain intervention specialists.

When considering scalability, online interventions hold a clear advantage. Teacher-led interventions are difficult to scale due to the need for small class sizes and individualized attention, making it challenging to serve many struggling readers (Donegan & Wanzek, 2021). Online programs, on the other hand, can be expanded with minimal additional cost, making them more feasible for districts with large student populations and limited instructional staff (Szili et al., 2022). Additionally, because digital tools allow students to work independently, schools can support more learners without requiring additional personnel. However, the scalability of online interventions depends on reliable internet infrastructure and adequate device availability, which are not guaranteed in all rural districts (Pindiprolu & Forbush, 2021).

The sustainability of reading interventions in rural settings depends on factors such as staffing stability, infrastructure maintenance, and professional development opportunities. Teacher-led approaches rely on consistent staffing and ongoing professional development, both of which can be unstable in rural areas due to high turnover rates and limited training opportunities (Goldhaber et al., 2020). Without well-trained, long-term staff, sustaining high-quality small-group instruction can be difficult. Online interventions, while potentially more sustainable from a staffing perspective, require ongoing infrastructure support, such as regular software updates, device maintenance, and IT support, to remain effective (Pindiprolu & Forbush, 2021). Schools must also ensure that teachers receive training on how to integrate digital tools effectively, as poor implementation can reduce the impact of online programs (Wijekumar et al., 2024).

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Both teacher-led and online interventions offer viable solutions for improving literacy in rural schools. While teacher-led approaches provide highly personalized instruction, they require more staffing and resources, making them difficult to sustain in underfunded districts. Online interventions offer adaptive, scalable learning models, but they require technology access and consistent student engagement.

For rural schools, a hybrid approach may be the most effective strategy—leveraging the engagement and scalability of online programs while maintaining teacher-led interventions for targeted support. Future research should explore best practices for integrating both models to maximize reading achievement in resource-limited environments.

### **HMH Into Reading Curriculum**

In the target district, the researcher utilized the HMH Into Reading Curriculum in their classroom. HMH Into Reading is a comprehensive literacy curriculum designed for grades K-6. It focuses on structured literacy and aims to improve reading and writing skills through engaging literature and knowledge-building connections. The program is organized by modules that explore central topics through various texts and projects, promoting student self-actualized learning. Additionally, it aligns with the Science of Reading research, ensuring effective instructional practices (HMH Education Company, 2025).

### ***HMH Into Reading Components***

The HMH Into Reading curriculum is designed to build literacy skills through a combination of reading, writing, vocabulary, and grammar instruction. It is organized into units, each focusing on a central theme or essential question. Within each unit, students will read a

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variety of fiction and nonfiction texts, including short stories, poetry, myths, articles, biographies, and historical texts (HMH Company, 2025).

Reading instruction emphasizes close reading strategies, where students analyze text structures, themes, and author's craft. They practice summarizing, making inferences, and comparing text-based responses. Vocabulary development is integrated into the curriculum, with explicit instruction on academic words, Greek and Latin words, affixes, and context clues.

Writing instruction follows a process-based approach, guiding students through drafting, revising, editing, and publishing their work. They engage in different types of writing, including narrative, informational, and argumentative pieces. Grammar and language conventions are embedded within writing lessons to reinforce proper use.

In addition to reading and writing, the curriculum emphasizes speaking and listening skills. Students participate in collaborative discussions, group activities, and oral presentations, strengthening their communication abilities.

Assessments include formative and summative evaluations, such as comprehension quizzes, unit tests, and performance tasks. The Into Reading curriculum also provides support to diverse learners by providing scaffolded instruction, offering resources for struggling readers.

### ***HMH Small Group Interventions and Waggle Online Program***

Embedded within the HMH curriculum are materials that align with the RTI model to provide support across tiers. The researcher used Tier 2 interventions methods provided by the curriculum for this study. They used the small group intervention piece, and the online program Waggle to compare reading gains with small group interventions to adaptive computer program interventions.

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The HMH Into Reading curriculum emphasizes personalized instruction through small group reading sessions, allowing the researcher to address individual student needs effectively. Within the Teacher's Corner on the HMH platform, resources are available to guide teachers in implementing these sessions. Additionally, a Teacher's Guide is included with the curriculum to drive small group instruction and reinforce skills taught during the whole group lesson. Small group instruction focuses on targeted skill development, helping students strengthen comprehension strategies, fluency, and vocabulary based on their specific needs (HMH Ed, 2025). The grouping of students is flexible and based on the diagnostic assessments the students take. They are then put into groups of three to five students and grouped based on ability level.

Also provided in the Into Reading curriculum is the online adaptive computer program Waggle. It is designed to complement classroom instruction by offering personalized learning experiences that target individual students' needs (HMH Company, 2025). The platform uses an adaptive practice approach, tailoring sessions to each student's proficiency level to reinforce skills and address areas needing improvement. Additionally, interactive activities engage students in active learning, allowing them to apply the concepts in various contexts, which enhances comprehension and retention (HMH Teacher's Corner, 2025).

Teachers can tailor the assignments on Waggle to the lesson they are teaching in class to reinforce those skills. The program also aligns to the scores students received on the MAPs assessment, which ensures that the practice materials align to each learner's performance level. Furthermore, progress monitoring features allow educators to track student growth over time and adjust instruction as needed.

Within the target district, the researcher was able to utilize both forms of Tier 2 instruction within the study. Data shows that the students received essentially the same

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instruction during intervention time, but one group received the practice in a small group while the other received practice on Waggle.

### **Summary**

The purpose of this study is to analyze and provide teachers with the best reading intervention strategies to improve the practice of reading instruction for 6<sup>th</sup> grade students in a rural Pennsylvania school, comparing two intervention strategies. Students at the target school consistently scored under the state average on the ELLA PSSA tests, according to the PSSA results. The Literature Review presented the Narrative Review, Theological Framework, and the Summary of this research.

### Chapter 3: Methods

#### Overview

The purpose of this study is to analyze and compare reading intervention outcomes among two classes of 6<sup>th</sup> grade students in a rural school. The 2022 National Assessment of Educational Progress reading assessment revealed notable declines in average reading scores for both fourth and eighth graders compared to 2019 (NAEP, 2022). Additionally, the school district used the diagnostic tool of the Growth Measure in the 2023-2024 school year to measure academic achievement. The Reading Growth Measure is a computer-based assessment designed to evaluate students' reading comprehension and language arts skills in relation to grade-level expectations. This research-based tool tracks student progress over time using scaled scores and performance levels to provide meaningful data. It measures student performance in three keyways: scaled scores, which align with specific performance levels; grade-level equivalency, which indicates how close a student is to meeting end-of-year grade-level expectations; and overall progress tracking. The assessment is administered at the beginning, middle, and end of the year to monitor student achievement and identify areas for improvement (Explanation of Growth Measure Scores and Metrics, 2024). Data shows the need for reform in reading instruction and interventions. To complete the study, two 6<sup>th</sup> grade reading classes in a rural district participated, taught by the general education teacher and researcher. Students received instruction using the Into Reading curriculum in whole group and received intervention time in a small group, serving as the independent variable. One of the classes receiving online intervention with the online program Waggle served as the control group, while the second class receiving small group intervention led by the general education teacher served as the experimental group. Reading success was measured by performance in the pre- and post-test, which was performed

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using the Measure of Academic Progress (MAPs) assessment, represented as the dependent variable. At the end of the experiment, the average increase in the MAPs assessment was compared to show which group had more growth over the course of the second half of the school year. The Methods Chapter includes the Design Methods, Research Question, Hypothesis, Participants and Setting, Instrumentation, Procedures, and Data Analysis.

### **Design**

This study employs quasi-experimental, non-equivalent groups designed to compare the reading success of students utilizing an online intervention program with those participating in small group, teacher-led interventions. The quasi-experimental design is a research approach that compares existing groups rather than randomly assigning participants to experimental and control groups (Gall et al., 2007). This method is often used in educational and social science research when randomization is not feasible, allowing researchers to examine the effects of an intervention or treatment in real-world settings. This research design was appropriate for this study because random assignment of students to intervention types is not feasible, due to reading classes already being predetermined before the start of the experiment. Instead, two pre-existing groups will be studied: Group A-students who are assigned to the online intervention program, and Group B-students participating in teacher-led small group interventions. I separated these groups to best answer my research question, with one group utilizing the district's web-based intervention program, and one group focusing on small-group intervention, led by the classroom teacher, in the general education classroom. Both groups were created from general education, 6<sup>th</sup> grade students, and the groups were similar in achievement scores and baseline reading data. They are part of the same school district and receive identical instruction from the classroom teacher, with the exception of the designated intervention period. Several unique challenges in

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rural schools could impact the ability to provide a quality education to the students who attend, including technology integration, personalized and one-on-one instruction, and the stability of teaching staff (Stein et al., 2022). Findings from this study can help rural districts customize reading intervention strategies that best meet the needs of their students.

The study will use a pre-test/post-test approach, with standardized reading assessments administered to both groups before the intervention begins and after its completion. The test that will be used is the MAPs assessment, which is the diagnostic tool that is used within the district to assess reading ability. MAPs is a computer adaptive assessment, which allows a student to respond to questions, and the test responds to the student, adjusting up or down the difficulty of the questions presented to the student. This creates a personalized assessment for every student. When students finish their MAP Growth test, they receive a number called a Rasch Unit scale (RIT) score for each area they are tested in. The RIT score is compared to other students across the country and given a percentile where they are performing based on the comparison. The pre-test was administered at the beginning of the second quarter, in February 2025, and the post-test was administered at the end of the 2025 school year, in May. The average scores from both the pre- and post-test were compared to analyze growth in reading achievement over the course of this time.

### **Research Questions**

**RQ1:** Which intervention showed the most significant growth in reading informational texts on the MAPs assessment?

**RQ2:** Which intervention showed the most significant growth in reading literature on the MAPs assessment?

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**RQ3:** Which intervention showed the most significant growth in vocabulary acquisition and use on the MAPs assessment?

### Hypothesis

**H<sub>0</sub>1:** Students receiving small group interventions will not demonstrate significantly greater gains in reading informational texts compared to students using the online intervention program, based on the MAPs assessment data.

**H<sub>0</sub>2:** Students receiving small group interventions will not demonstrate significantly greater gains in reading literature compared to students using the online intervention program, based on the MAPs assessment data.

**H<sub>0</sub>3:** Students receiving small group interventions will not demonstrate significantly greater gains in vocabulary acquisition and use compared to students using the online intervention program, based on the MAPs assessment data.

### Participants and Setting

Within this section, information will be found regarding the population of where the data was collected, participants in the study, and setting.

#### Population

The rural school being studied is located in central Pennsylvania. Within this county, there are 77,904 residents; 96% of the population is white, and 71% is categorized as economically disadvantaged, with 14% living in poverty. 54% of the population is in the workforce, and the median income for families is \$52,826, which is lower than the national average of \$69,021 (Future PA Ready Index, 2024).

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There are 1,057 students enrolled at the rural elementary school, which houses kindergarten through sixth grade. The school continues to face setbacks that align with the challenges of a rural school. On the Pennsylvania System of School Assessment (PSSA) in 2023, the performance level for the district was 37.5% proficient or advanced in English Language Arts (ELA), 33% proficient or advanced in Math, and 57.4% proficient or advanced in Science (PA Department of Education, 2023). The district falls below the state average in Math and ELA but did perform above the state average in science. When focusing on 6<sup>th</sup> grade specifically, the average is well below the state standard. In 2023, the state average for PSSA scores on the ELA test for 6<sup>th</sup> graders was 18.8% advanced, 36.8% proficient, 36.3% basic, and 8.1% below basic. In the rural school district, 9.1% scored advanced, 30.5% proficient, 44.2% basic, and 16.2% below basic (PA Department of Education, 2024). The gap between the school district's PSSA scores and the state averages is significant, which shows a need for a change in instruction and intervention delivery.

The participants in this study were selected from a 6th-grade class in a rural elementary school in Pennsylvania using purposive, typical case sampling. This sampling method was chosen to ensure that the participants represented a typical demographic of rural 6th-grade students, making the findings more applicable to similar educational settings. Purposive sampling allowed for the intentional selection of students based on specific criteria, such as enrollment in a general education classroom, comparable baseline reading levels, and exposure to the same instructional methods, aside from the intervention. By using typical case sampling, the study aimed to examine reading interventions within a setting that reflects common characteristics of rural schools, ensuring that the results could be meaningfully interpreted in the context of similar educational environments. Data was collected over the course of the second

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half of the 2024-2025 school year. Within this grade, there are eight Language Arts classes, but only two were selected. Two classes were selected because these classes have the same teacher and receive the same instruction. Incorporating other classroom teachers could skew results since the students would be receiving different Tier 1 instruction. All participants received Tier 1 instruction using the Houghton Mifflin Harcourt (HMH) Into Reading Program.

### Participants

Students selected were in 6<sup>th</sup> grade in a rural elementary school, serving grades K-6. The rural school is a Title 1 school, and all students receive a free and reduced lunch, as 65% of the population is classified as economically disadvantaged (Future PA Ready Index, 2024). The student body consists of 1,020 students, 51% being male and 49% being female, and the following population percentages: 94.8% white, 3.2% more than two races, 1.4% Hispanic, and 0.5% Asian (Future PA Ready Index, 2024). For this study, the number of participants sampled were 42 sixth grade, general education students. There were 157 students in this grade, and 42 of the students were selected to participate in the study. Students were selected based on which ones were receiving the general education 6<sup>th</sup> grade reading curriculum and were assigned to the classes of the researcher/general education teacher. Students who were in reading classes receiving either remediation or accelerated curriculum were eliminated from the sample because they would not consistently be receiving the same instruction, due to using a different Tier 1 curriculum. Participants range in age from 11-12 and are spread across two classes. The classes are set up as followed:

Class #	Boy Students	Girl Students	Total Students
Class 1	7	10	17

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Class 2	14	11	25
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The study consisted of two groups (a) students who received twenty minutes on the online intervention program Waggle, twice a week and; (b) students who received small group, direct instruction led by the teacher for twenty minutes, twice a week. Group A was the control, and Group B was the experimental group. Intervention time was administered during class, by the general education teacher. The teacher used intervention materials for small group instruction provided by the HMH Into Reading curriculum.

For small group instruction, the students were assigned to their groups based on their beginning of the year MAPs assessment scores. These scores assigned students in groups of equal levels. Intervention was then determined based on needing supplemental instruction or accelerated instruction, based on if the student is performing on a 6<sup>th</sup> grade reading level.

### **Setting**

The students received whole group instruction using the HMH Into Reading Curriculum. Students received in-person instruction, and intervention within the general education classroom where they received whole-group instruction. Students used the online intervention program Waggle, which aligns to their needs based on their performance on the MAPs assessment, and adjusts interventions based on program success.

### **Instrumentation**

The Measures of Academic Progress (MAP) assessment is designed to measure a student's academic achievement and growth over time in reading and mathematics (Map Growth Fact Sheet, 2023). MAP is a computer adaptive diagnostic assessment. In a computer adaptive assessment, as a student responds to questions, the test responds to the student, adjusting up or

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down the difficulty of the questions presented to the student. This creates a personalized assessment for every student. Due to this, there is not a specific number of questions on the MAPs assessment. When students finish their MAP Growth test, they receive a number called a Rasch Unit scale (RIT) score for each area they are tested in. The RIT score is compared to other students across the country and given a percentile where they are performing based on the comparison. According to the Northwest Evaluation Association (NWEA) (2023):

The NWEA 2020 MAP Growth norms study provides achievement status and growth norms for individual students and grade levels within schools in each of the four subject areas: reading, language usage, mathematics, and general science. The study's results are based on K–12 grade level samples. Records are sampled from between 3.6 and 5.5 million test scores from 500,000 to 700,000 students attending over 24,500 public schools in 5,800 districts spread across all 50 states.

This population size ensures that the data collected from the MAPs assessment is valid. The MAP assessment will be used as a pre- and post-test to evaluate the difference in reading growth between the control and experimental groups (Map Growth Fact Sheet, 2023). According to Gall et al. (2007), a t-test is the most appropriate for data comparison, as we are comparing the averages in Rasch Unit scale (RIT) scores between the two groups, using the pre- and post-tests.

### **Procedures**

Participants were chosen from a 6<sup>th</sup> grade class in a rural school. The Language Arts classes in which the interventions took place were 80 minutes every day, and these classes received one week of whole group instruction, and one week of independent practice and intervention through centers. For the independent practice, the students would first receive a 20-

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minute whole-group grammar lesson and then be separated into their small groups. Students would go through six centers across two days, and the centers included the following: Center 1-intervention, Center 2-vocabulary, Center 3-Rigby Reader assigned through HMH, Center 4-supplemental story to reiterate the skills that were taught in the whole group instruction, Center 5-writing, Center 6-independent reading. The students rotated through the centers in 20-minute intervals, so that they got through three centers a day. Once they got through all six centers over the course of two days, the students would be given new activities, utilizing the same centers, for the next two days. Students had time on the last day of the week to complete work they did not finish during center time that week. One class categorized as Group A utilized the online intervention program Waggle for 20 minutes three times a week, while the second class categorized as Group B received small group, teacher-led intervention for 20 minutes three times a week. Small groups consisted of a range of three to five students per group. The teacher was trained in using the Waggle program and analyzing data, showing student use and student success within the program. The teacher using small group instruction in their classroom used the intervention piece embedded into the HMH Into Reading Curriculum. The intervention piece provides instruction for students performing below grade level, on grade level, and above grade level. Interventions that were used were determined using data from the MAPs assessment. Small group instruction was focused on comprehension strategies, reading strategies, and vocabulary building activities.

When determining small groups, students were placed with others who achieved a similar score on the MAPs assessment. The district used the MAPs assessment as their diagnostic tool to show student achievement in reading. Student performance data on the MAPs assessment was used to determine the appropriate interventions needed during small group instruction.

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Students received intervention time for 18 weeks of the 2024-2025 school year. At the end of the year, students took the MAPs assessment again, and the growth of the students was compared between the control group receiving the online intervention program and the experimental group receiving small group teacher-led interventions.

At all stages of data collection, all information that could identify the participants was protected. Data were stored securely on an Excel spreadsheet, and only the researcher had access to records. Data was stored on a password-protected computer. When not being utilized, the computer was stored in a locked classroom. The data will be retained for a period of five years after the completion of this research study. IRB permission and district consent forms were obtained prior to starting the research.

### **Data Analysis**

Data from the middle of the year MAPs assessment to the end of the school year will be analyzed for reading achievement. The dependent variable is the test scores, while the independent variable is the type of intervention the students receive (small group vs. online program). A t-Test was used to compare the mean gain scores between the two independent variables. According to Gall (2007), a t-test will determine whether there is a statistically significant difference in the mean gain scores of the two groups. Averages of the RIT scores from both groups in the pre-test will be compared to the average RIT scores from both classes in the post-test, assessing the three areas of research- reading informational texts, reading literature, and vocabulary acquisition and use. Descriptive statistics including mean, standard deviation, and range will be calculated for both groups to summarize pre-test and post-test performance. According to Gall (2007), there are three assumptions when conducting a t-test, which are that the scores form an interval or ratio scale of measurement, scores in the populations under study

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are normally distributed, and score variances for the populations under study are equal. The students are all in 6<sup>th</sup> grade and receiving the same Tier 1 instruction from the same classroom teacher.

Statistical procedures will be used for each hypothesis as the following:

### **Hypothesis 1 (Ho1)**

*Students receiving small group interventions will demonstrate significantly greater gains in reading informational texts compared to students using the online intervention program.*

- **Statistical Procedure:** Independent samples t-Test to compare the mean gain scores.
- **Effect Size:** Cohen's d to quantify the magnitude of differences. According to Cohen's conventions, effect sizes are interpreted as small ( $d = 0.2$ ), medium ( $d = 0.5$ ), and large ( $d = 0.8$ ).
- **Alpha Level:** Set at 0.05 to determine statistical significance.

### **Hypothesis 2 (Ho2)**

*Students receiving small group interventions will demonstrate significantly greater gains in reading literature compared to students using the online intervention program.*

- **Statistical Procedure:** Independent samples t-Test to compare the mean gain scores.
- **Effect Size:** Cohen's d to report the practical significance of the observed differences. According to Cohen's conventions, effect sizes are interpreted as small ( $d = 0.2$ ), medium ( $d = 0.5$ ), and large ( $d = 0.8$ ).
- **Alpha Level:** Set at 0.05 to determine statistical significance.

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**Hypothesis 3 (Ho3)**

*Students receiving small group interventions will demonstrate significantly greater gains in vocabulary acquisition and use compared to students using the online intervention program.*

- **Statistical Procedure:** Independent samples t-Test to compare the mean gain scores.
- **Effect Size:** Cohen's d to report the practical significance of the observed differences.

According to Cohen's conventions, effect sizes are interpreted as small ( $d = 0.2$ ), medium ( $d = 0.5$ ), and large ( $d = 0.8$ ).

- **Alpha Level:** Set to 0.05 to determine statistical significance.

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## CHAPTER FOUR: FINDINGS

**Overview**

The purpose of this quantitative quasi-experimental case study was to analyze and compare reading intervention outcomes among two classes of 6<sup>th</sup> grade students in a rural school. This chapter presents descriptive statistics of the three research questions along with an analysis of the results.

**Research Questions**

**RQ1:** Which intervention showed the most significant growth in reading informational texts on the MAPs assessment?

**RQ2:** Which intervention showed the most significant growth in reading literature on the MAPs assessment?

**RQ3:** Which intervention showed the most significant growth in vocabulary acquisition and use on the MAPs assessment?

**Hypothesis**

**H<sub>0</sub>1:** Students receiving small group interventions will not demonstrate significantly greater gains in reading informational texts compared to students using the online intervention program, based on the MAPs assessment data.

**H<sub>0</sub>2:** Students receiving small group interventions will not demonstrate significantly greater gains in reading literature compared to students using the online intervention program, based on the MAPs assessment data.

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**H<sub>0</sub>3:** Students receiving small group interventions will not demonstrate significantly greater gains in vocabulary acquisition and use compared to students using the online intervention program, based on the MAPs assessment data.

### Descriptive Statistics

#### *Group A Descriptive Statistics*

The descriptive statistics for Group A's Measures of Academic Progress (MAP) scores provide a clear snapshot of student performance across four key domains: overall RIT scores, Reading Literature, Reading Informational Texts, and Vocabulary Acquisition and Use. Seventeen students were analyzed in Group A, which received small group, teacher-led interventions. The MAP assessment was given in the middle of the year (MOY) and end of the year (EOY). The data from this assessment are described in the following paragraphs.

The RIT MOY (middle of year) mean was 215.12, with a median of 214 and a standard deviation of 8.51, indicating moderate variability in student performance. By the EOY (end of year), the mean decreased slightly to 214.82, with a consistent median of 214 and a slightly lower standard deviation of 7.26, suggesting slightly less variation in scores. The most frequent scores (modes) were 213 for MOY and 221 for EOY, showing that while the average remained steady, the most common EOY score was higher (see Table 1).

**Table 1**

*Descriptive Statistics of MAPs scores for Group A*

	Count	Mean	Standard Deviation	Minimum	Maximum	Median	Mode
<b>RIT MOY</b>	17	215.12	8.51	204	230	214	213

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<b>RIT EOY</b>	17	214.82	7.26	203	232	214	221
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For the Reading Information Texts domain at MOY, the mean score was 214.06, with a median of 213.0 and a mode of 203.0. The standard deviation was 9.68, reflecting a relatively wide spread of scores ranging from 200 to 230. This suggests that while the average performance was moderate, there was significant variability, with some students scoring considerably lower than others. By EOY, the mean remained virtually the same at 214.00, but the median rose to 216.0 and the mode also increased to 216.0, indicating a shift in the most common performance level. The standard deviation dropped to 7.26, and scores ranged from 198 to 224, showing a reduction in performance variability (see Table 2).

**Table 2**

*Descriptive Statistics of Reading Informational Text scores for Group A*

	<b>Count</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Median</b>	<b>Mode</b>
<b>Reading Informational Texts MOY</b>	17	214.06	9.68	200	230	213	203
<b>Reading Informational Texts EOY</b>	17	214	7.26	198	224	216	216

In the Reading Literature domain, students started with a MOY mean of 215.12 and a median of 217, but this dropped to a mean of 213.18 and a median of 214 by EOY. The standard deviation increased from 7.02 to 8.53, indicating growing disparities in student achievement. The mode also shifted from 205 (MOY) to 209 (EOY), suggesting changes in the distribution of scores over time (see Table 3).

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**Table 3***Descriptive Statistics of Reading Literature scores for Group A*

	Count	Mean	Standard Deviation	Minimum	Maximum	Median	Mode
<b>Reading Literature MOY</b>	17	215.12	7.02	202	228	217	205
<b>Reading Literature EOY</b>	17	213.18	8.53	196	234	214	209

In the Vocabulary Acquisition and Use category, the MOY mean was 216.41, with a median of 214 and a mode of 218. By EOY, the mean slightly increased to 217.06, and the median rose to 218, with the same mode of 218. The standard deviation decreased from 12.07 to 11.31, suggesting more consistent performance across the class by the end of the year. The mode remained the same at 218 for both MOY and EOY scores (see Table 4).

**Table 4***Descriptive Statistics of Vocabulary Acquisition and Use scores for Group A*

	Count	Mean	Standard Deviation	Minimum	Maximum	Median	Mode
<b>Vocabulary Acquisition and Use MOY</b>	17	216.41	12.073	195	237	214	218
<b>Vocabulary Acquisition and Use EOY</b>	17	217.06	11.305	189	233	218	218

In conclusion, Group A saw an overall slight decrease in scores from the middle to end of year in all areas, except in the domain of Vocabulary Acquisition and Use. While overall scores decreased, it should be noted that the standard deviation also decreased in all domains except

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Reading Literature, suggesting that student scores became more similar by the end of the year—a sign that lower-performing students may have caught up or that performance across the group became more consistent.

### *Group B Descriptive Statistics*

The descriptive statistics for Group B’s Measures of Academic Progress (MAP) scores provide a clear snapshot of student performance across four key domains: overall RIT scores, Reading Literature, Reading Informational Texts, and Vocabulary Acquisition and Use. Twenty-five students were analyzed in Group B, which received adaptive online program interventions. The MAP assessment was given in the middle of the year (MOY) and end of the year (EOY). The data from this assessment are described in the following paragraphs.

The RIT MOY (middle of year) mean was 214.36, with a median of 214.0 and a standard deviation of 8.24, indicating moderate variability in student performance. By the EOY (end of year), the mean increased slightly to 216.64, with a higher median of 219 and a slightly increased standard deviation of 8.45, suggesting slightly more variation in scores. The most frequent scores (modes) were 207 for MOY and 219 for EOY, showing a shift in the most achieved score over time (see Table 5).

**Table 5**

*Descriptive Statistics of MAPs scores for Group B*

	<b>Count</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Median</b>	<b>Mode</b>
<b>RIT MOY</b>	25	214.36	8.24	199	229	214	207
<b>RIT EOY</b>	25	216.64	8.45	202	236	219	219

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For the Reading Informational Texts domain at MOY, the mean score was 214.84, and the standard deviation was 11.37, suggesting a moderate degree of variability in scores. The minimum score recorded was 191, while the maximum reached 232, showing a widespread in performance. The median was 215, aligning closely with the mean, and the mode was 202. By EOY, the mean slightly increased to 215.04, and the standard deviation decreased to 9.61, reflecting less variability and more consistency in student scores. The range narrowed somewhat, with scores spanning from 194 to 230. The median increased to 218, while the mode also rose to 208, signaling a shift in the typical score achieved by students (see Table 6).

**Table 6**

*Descriptive Statistics of Reading Informational Text scores for Group B*

	<b>Count</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Median</b>	<b>Mode</b>
<b>Reading Informational Texts MOY</b>	25	214.84	11.37	191	232	215	202
<b>Reading Informational Texts EOY</b>	25	215.04	9.61	194	230	218	208

In the Reading Literature domain, students began with a MOY mean of 213.68 and a median of 217, which slightly increased to a mean of 215.20 and a median of 215 by EOY. However, the standard deviation rose from 9.49 to 11.75, indicating an increase in score variability. The mode also shifted from 211 at MOY to 210 at EOY, suggesting some changes in score distribution across the group (see Table 7).

**Table 7**

*Descriptive Statistics of Reading Literature scores for Group B*

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	Count	Mean	Standard Deviation	Minimum	Maximum	Median	Mode
<b>Reading Literature MOY</b>	25	213.68	9.49	197	230	217	211
<b>Reading Literature EOY</b>	25	215.2	11.75	186	235	215	210

For the Vocabulary Use and Acquisition domain, at MOY, the mean score was 214.84, and the standard deviation was 7.65, indicating a relatively moderate spread of scores. The scores ranged from a minimum of 201 to a maximum of 229, reflecting some variation across students. The median was 215, aligning closely with the mean, while the mode was 218, indicating the most frequently occurring score in this group. By EOY, the mean increased significantly to 220.16, suggesting notable improvement in vocabulary performance. The standard deviation rose to 11, indicating a wider spread of scores by the end of the year. The range expanded, with scores spanning from a minimum of 198 to a maximum of 250, showing greater variability among students. The median also increased to 222, and the mode shifted to 216, suggesting both central tendency and typical performance improved (see Table 8).

**Table 8**

*Descriptive Statistics of Vocabulary Acquisition and Use scores for Group B*

	Count	Mean	Standard Deviation	Minimum	Maximum	Median	Mode
<b>Vocabulary Acquisition and Use MOY</b>	25	214.84	7.65	201	229	215	218

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<b>Vocabulary Acquisition and Use EOY</b>	25	220.16	11	198	250	222	216
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In conclusion, Group B showed modest increases in mean scores from MOY to EOY in all domains, with the highest increase being in the Vocabulary Use and Acquisition domain. Although the standard deviations rose slightly in these areas, the overall upward trend in medians and modes suggests that several students made academic progress during the intervention period. While the descriptive statistics provide a snapshot of student performance patterns, inferential statistical analysis was conducted to determine whether the differences observed between the two groups were statistically significant. The following section reports the results for the hypothesis testing on each assessment domain.

## Results

### Hypothesis 1

**H<sub>0</sub>1:** Students receiving small group interventions will not demonstrate significantly greater gains in reading informational texts compared to students using the online intervention program, based on the MAPs assessment data.

**Table 9**

*Summary of t-Test Results for Reading Informational Texts*

	Small Group Mean Gain	Online Mean Gain	t	df	p	Cohen's d	Effect Size Interpretation	Statistical Significance
<b>Reading Informational Texts</b>	-0.06	+0.20	0.60	40	0.56	-0.03	Negligible	Not significant

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An independent samples t-test was conducted to evaluate whether students receiving small group instruction demonstrated greater gains in Reading Informational Texts compared to those using an online intervention. The analysis revealed no statistically significant difference between the two groups,  $t(40) = 0.60, p = .56$ . The effect size was negligible ( $d = -0.03$ ), indicating no practical difference (see Table 9). Therefore, the null hypothesis was not rejected, suggesting that small group instruction did not result in significantly greater gains than the online program in this domain.

### Hypothesis 2

**H<sub>0</sub>2:** Students receiving small group interventions will not demonstrate significantly greater gains in reading literature compared to students using the online intervention program, based on the MAPs assessment data.

**Table 10**

*Summary of t-Test Results Reading Literature*

	Small Group Mean Gain	Online Mean Gain	t	df	p	Cohen's d	Effect Size Interpretation	Statistical Significance
<b>Reading Literature</b>	-1.94	+1.52	-1.71	40	0.095	-0.37	Small	Not significant

An independent samples t-test was conducted to evaluate whether students receiving small group instruction demonstrated greater gains in Reading Literature compared to those using an online intervention. The results showed no statistically significant difference between

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groups,  $t(40) = -1.71, p = .095$ . However, the effect size ( $d = -0.37$ ) indicates a small practical difference, favoring the online intervention (see Table 10). Despite the numerical advantage for the online group, this difference was not large enough to reach statistical significance. The null hypothesis was not rejected.

### Hypothesis 3

**H<sub>0</sub>3:** Students receiving small group interventions will not demonstrate significantly greater gains in vocabulary acquisition and use compared to students using the online intervention program, based on the MAPs assessment data.

**Table 11**

*Summary of t-Test Results for Vocabulary Acquisition and Use*

	Small Group Mean Gain	Online Mean Gain	t	df	p	Cohen's d	Effect Size Interpretation	Statistical Significance
Vocabulary Acquisition and Use	+0.65	+5.32	-2.93	40	0.006	-0.44	Small to approaching medium	Significant

An independent samples t-test was conducted to evaluate whether students receiving small group instruction demonstrated greater gains in Vocabulary Acquisition and Use compared to those using an online intervention. A statistically significant difference was found,  $t(40) = -2.93, p = .006$  (see Table 11). Students in the online intervention group demonstrated significantly greater gains than those in the small group. The effect size was  $d = -0.44$ , which represents a small to approaching medium practical difference. The null hypothesis was rejected for this outcome, suggesting the online program was more effective in improving vocabulary skills.

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## CHAPTER FIVE: CONCLUSIONS

**Overview**

The purpose of this quantitative quasi-experimental case study was to analyze and compare reading intervention outcomes among two classes of 6<sup>th</sup> grade students in a rural school. This chapter will explore the interpretation of the study's findings and their implications for policy and practice. It will conclude with discussions of implications and limitations, along with recommendations for future research.

**Discussion**

The purpose of this quantitative quasi-experimental case study was to analyze and compare reading intervention outcomes among sixth-grade students in a rural school who received either small group instruction or an adaptive computer-based program. This chapter discusses the findings of the study broken down by research questions, relevant literature, and theoretical frameworks. Each research question is examined with comparisons to prior studies, highlighting how the present results align with or diverge from existing knowledge in the field. The chapter also interprets findings through the lenses of Self-Determination Theory (SDT) and the Zone of Proximal Development (ZPD), which served as the theoretical underpinnings of the research.

**Research Question 1 (RQ1):**

*Which intervention showed the most significant growth in reading informational texts on the MAPs assessment?*

The results for RQ1 indicated that there was no statistically significant difference in gains in reading informational texts between students receiving small group interventions and those

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using the adaptive online program Waggle (Cohen's  $d = -0.03$ ). This outcome suggests that neither intervention type provided a distinct advantage in improving students' informational text comprehension, concluding that neither intervention proved to be effective in the domain of reading informational texts.

These findings differ with Stein et al. (2022), who found that while online programs like Lexia and iStation were effective in supporting reading skills, they did not necessarily outperform traditional teacher-led instruction in every area. In this case, neither intervention was successful during this study. Similarly, Donegan and Wanzek (2021) emphasized that the effectiveness of small group interventions depends heavily on implementation fidelity and alignment with Tier 1 instruction—both of which can vary significantly in rural settings. Small-group instruction allows educators to personalize learning experiences, addressing students' specific academic needs while fostering deeper engagement. This approach is especially beneficial in rural schools, where teachers often manage diverse student needs with limited instructional resources (Batista, 2019).

Vygotsky's Zone of Proximal Development (ZPD) framework underscores the importance of tailored scaffolding that targets the student's potential developmental zone (Doolittle, 1995; Clapper, 2015). If instruction, whether online or in-person, does not sufficiently challenge or support the learner within that optimal range, growth may stagnate. The flat outcome in this domain could also suggest that both groups needed more robust or differentiated support specifically tailored to the cognitive demands of informational texts.

Moreover, Self-Determination Theory (Deci & Ryan, 2000) posits that competence, autonomy, and relatedness must be present for optimal motivation. If neither intervention fostered intrinsic motivation around informational reading—which is often perceived as less

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engaging than narrative texts—students may not have experienced the persistence necessary to achieve substantial gains. This is particularly relevant given that 64.5% of the students in the rural district are economically disadvantaged and may lack foundational support at home (PA Ready Index, 2024), making motivational components of instruction even more critical.

### **Research Question 2 (RQ2):**

*Which intervention showed the most significant growth in reading literature on the MAPs assessment?*

Results from RQ2 showed a small but not statistically significant difference in favor of the online intervention group in reading literature (Cohen's  $d = -0.37$ ,  $p = 0.095$ ). Although the online program slightly outperformed small group instruction, the results do not suggest a conclusive advantage.

This finding partially supports Alqahtani (2020), who noted that adaptive platforms can enhance reading motivation and comprehension when they provide interactive feedback and context-sensitive questioning. However, other studies, including those by Donegan and Wanzek (2021) and Solari et al. (2018), reinforce the idea that face-to-face small group instruction enables real-time feedback and deeper engagement—benefits that are particularly valuable for literature, which often requires interpretation and discussion.

The role of SDT is again relevant here. While the online group may have experienced enhanced autonomy and competence due to adaptive scaffolding and gamified features (Stone, Deci, & Ryan, 2009), the lack of relatedness—one of SDT's core tenets—may have limited engagement. In contrast, small group sessions allow for the development of student-teacher relationships and peer discussion, which support motivation and learning (Capin et al., 2024).

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This result also echoes findings by Robinson (2013) and Capin et al. (2024), who emphasized the importance of balancing instructional quality with contextual constraints in rural schools. While online programs can reduce teacher workload (Stein et al., 2022), they may not always foster the same depth of literary engagement as teacher-facilitated discussions.

### **Research Question 3 (RQ3):**

*Which intervention showed the most significant growth in vocabulary acquisition and use on the MAPs assessment?*

The most notable finding from this study emerged in RQ3. Students in the online intervention group made significantly greater gains in vocabulary acquisition and use compared to those in the small group intervention ( $p = 0.006$ , Cohen's  $d = -0.44$ ).

This supports the findings of Campbell et al. (2022), who reported that adaptive learning systems significantly improve vocabulary skills, especially when instruction is tailored to students' performance. Additionally, Pindiprolu and Forbush (2021) found that computer-based programs like Funnix and Headsprout are effective in promoting vocabulary and phonemic awareness, especially for at-risk learners.

The success of the Waggle platform in this area may be explained through the lens of ZPD: its ability to continuously adjust based on student performance mirrors the scaffolding process Vygotsky advocated (Silalahi, 2019). Students were likely able to operate within their optimal learning zone more consistently than in a small group setting, where instructional time and personalization may have been constrained by staffing challenges typical of rural schools (Goldhaber et al., 2020).

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This result also aligns with the SDT framework. Waggle’s interactive and self-paced format likely enhanced students’ sense of autonomy and competence, both of which are essential for sustained intrinsic motivation (Deci & Ryan, 2000). As emphasized by Syal and Nietfeld (2024), gamified digital interventions foster engagement and vocabulary retention, especially when integrated with real-time feedback.

The comparatively lower gains in the small group setting could reflect findings by Stevens et al. (2020), who noted that while teacher-led interventions improve comprehension and vocabulary, their success often depends on how well they are aligned with Tier 1 instruction and implemented consistently—factors that can be difficult to manage in resource-strapped rural schools.

### **Implications**

The findings of this study offer meaningful implications for both instructional practice and educational leadership in rural schools. The results suggest that adaptive online interventions can contribute to student growth more than small group teacher led interventions, though neither emerged as definitively superior across all reading domains. Notably, the adaptive computer-based intervention produced statistically significant gains in Vocabulary Acquisition and Use, suggesting that such platforms may be particularly effective for reinforcing discrete literacy skills. Additionally, small group teacher led interventions did not prove to be effective in student growth.

For classroom teachers, this indicates that integrating adaptive programs into existing reading instruction may help bridge vocabulary gaps, especially in environments where one-on-one instruction is difficult to sustain. At the same time, the lack of significant difference in

## READING INTERVENTIONS

reading informational text and literature performance underscores the importance of ensuring that both types of interventions are implemented with fidelity and aligned to core instructional goals.

School administrators and district leaders may view these findings as justification for adopting a hybrid intervention model—blending teacher-led small group instruction with adaptive digital platforms. This approach offers the flexibility to address individual learning needs while maximizing limited staffing and resources. In rural schools, where teacher shortages and funding constraints are often acute, a combination model may offer the most sustainable and effective solution.

Theoretically, the results support the application of differentiated instruction principles and intervention strategies that respond to the unique needs of rural learners. Interventions that are carefully structured and supported—whether digital or teacher-directed—can foster meaningful literacy growth when they account for student motivation, developmental readiness, and consistent progress monitoring.

### **Limitations**

Several limitations must be acknowledged when interpreting the findings of this study. First, the study employed a quasi-experimental design using intact classroom groups. As such, random assignment was not possible, which limited the ability to fully control preexisting differences between the groups. Although groups were predetermined, the study controlled initial differences by measuring gains across each domain of reading proficiency.

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Second, the sample size was relatively small and drawn from a single rural school district. While the findings provide valuable insight into reading intervention practices in similar contexts, they may not be generalizable to more diverse or urban populations. The sample size was chosen to maintain consistency among instruction with the researcher being the only teacher.

Third, the intervention period spanned only 18 weeks. It is possible that a longer implementation window would have yielded different results, particularly in more complex areas like reading comprehension of literature and informational texts.

Additionally, both intervention types were delivered by the same classroom teacher, which may have introduced bias. Although consistent instruction is a strength of the design, the teacher's familiarity with the small group students may have influenced the quality or focus of instruction. One limitation of having a single classroom teacher deliver the small-group instruction was the potential for inconsistency if the teacher was absent. Although this occurred only once during the study, a substitute teacher—who was not trained in implementing the HMH Into Reading interventions—conducted the instruction on that occasion. This introduced a minor inconsistency in intervention delivery, as the substitute may have implemented the program differently than the researcher intended.

Finally, the study relied solely on the MAPs assessment to measure growth. While this assessment provides valid and reliable data on reading skills, it may not fully capture qualitative differences in engagement, strategy use, or reading motivation. If students were given an assessment on paper/pencil, it could have resulted differently than the MAPs assessment that is administered on the computer.

### **Recommendations for Future Research**

## READING INTERVENTIONS

Based on the results and limitations of this study, several directions for future research are recommended. The first recommendation would be to broaden the scope of the sample. Future studies should include a larger and more diverse sample of schools to improve generalizability. Including schools from urban and suburban areas would allow for comparisons across geographic and socioeconomic contexts. The HMH Curriculum is a nationally recognized curriculum, so schools could be included using a similar research model.

The next recommendation would be to examine hybrid models. Given the potential benefits of both teacher-led and online interventions, future research should explore hybrid approaches that strategically combine both methods to maximize student outcomes. The hybrid model is something that could be utilized in the target district, due to them having access to both small group interventions and online program interventions through the curriculum they are currently implementing. Hybrid models could be used across grade levels, and not only in 6<sup>th</sup> grade.

The third recommendation would be to investigate subgroup differences. Research could also explore how interventions affect students with specific characteristics, such as English language learners, students with disabilities, or students who are significantly below grade level. The target school district has a large population of students with disabilities and students who are significantly below grade level. Research could be conducted to explore which method leads to a higher level of achievement among these subgroups.

Additionally, future studies should consider investigating qualitative factors not captured by the MAPs assessment, such as student engagement, strategy use, and motivation. Although MAPs provide reliable quantitative data on academic gains, it does not measure how students interact with the material or how motivated they are during the intervention. During the study,

## READING INTERVENTIONS

the researcher noted that students seemed more engaged during small group intervention. They were more willing to participate in small groups than the students who used Waggle. Researchers could gather observational data, conduct interviews, or administer engagement surveys to determine how different interventions impact student motivation and preferences. These insights would add depth to our understanding of why certain approaches may be more effective or sustainable over time.

The last recommendation would be to analyze the cost-effectiveness of both programs. Given the resource constraints of many rural schools, studies examining the cost-effectiveness of each intervention model would help decision-makers allocate funding more efficiently. Since the results of online programs and small group interventions were similar, rural districts could choose the intervention that would be most cost-effective for their district.

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## Appendix A

## SRU IRB Approval



TO: Dr. Whitney Wesley  
Curriculum, Instruction, and Educational Leadership

A handwritten signature in blue ink that reads "James A. Preston".

FROM: James Preston, D.Ed., Chairperson  
Institutional Review Board (IRB)

DATE: April 25, 2025

RE: Protocol #: 2025-066-17-A  
Protocol Title: Analysis of Small Group Reading Intervention Success at a  
Rural Elementary School in Pennsylvania: A Case Study

The Institutional Review Board (IRB) of Slippery Rock University received the requested modifications to the above-referenced protocol.

The IRB has reviewed the modifications and approved the protocol under the EXEMPT category of review.

You may begin your project as of April 25, 2025. Your protocol will automatically close on April 24, 2026, unless you request, in writing, to keep it open.

Please contact the IRB Office by phone at (724)738-4846 or via email at [irb@sru.edu](mailto:irb@sru.edu) should your protocol change in any way.

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## Appendix B

## MAPs Assessment Sample Questions

*Vocabulary Use and Acquisition*

Read the passage.

## The President's Cabinet

In the United States government, the cabinet consists of the vice president and fifteen secretaries who are responsible for various parts of the government. Although the president appoints the secretaries, they must be approved by a vote in the Senate. Each member of the cabinet advises the president. These people are trusted with important tasks and with helping to make decisions. Cabinet members meet regularly with the president to discuss issues.

Choose the word that has the same meaning as appoints.

Word in Passage	Meaning of Word
<u>appoints</u>	

chooses

knows

leads

visits

*Reading Literature*

There are 12 lines in the poem excerpt. The poem excerpt is numbered every 5 lines.

from **Be a Friend**

Cheer the youth who's bravely trying,  
Pity him who's sadly sighing;  
Just a little labor spend  
On the duties of a friend.

Be a friend. The pay is bigger  
(Though not written by a figure)  
Than is earned by people clever  
In what's merely self-endeavor.  
You'll have friends instead of neighbors  
For the profits of your labors;  
You'll be richer in the end  
Than a prince, if you're a friend.

(from "Be a Friend" by Edgar A. Guest)

This question has two parts. Answer Part A, and then answer Part B.

**Part A**

Which theme is developed in the excerpt?

1. Friends worry about each other.
2. Forming a friendship takes effort.
3. Friendship leads to great rewards.
4. Neighbors can be wonderful friends.

5

10

**Part B**Which line from the poem best supports the theme?

1. "Pity him who's sadly sighing;" (Line 2)
2. "Just a little labor spend" (Line 3)
3. "Than is earned by people clever" (Line 7)
4. "You'll be richer in the end" (Line 11)

## READING INTERVENTIONS

*Reading Informational Texts*

Read the passage. There are several questions about this passage.

### Beautiful Invader

- 1 Imagine yourself taking a walk on a summer day—somewhere in a lazy meadow, near a stream. All along the stream banks and up through the grasses in the meadow, a flowering plant grows from three to ten feet tall. You admire the tiny flowers and their stunning rosy-purple color. You whip out your cell phone and are about to capture a photo when you hear a scolding voice in your head ask: "Why are you about to take a picture of purple loosestrife? It's not something to celebrate. It's an invasive species!"



Purple loosestrife (*Lythrum salicaria*)

- 2 Purple loosestrife isn't native to North America. It is originally from Europe and Asia. In North America, purple loosestrife grows so thickly and spreads so rapidly that it crowds out native grasses and other flowering plants. Furthermore, wildlife that depends on native plants for food and shelter suffer

The author presents the argument that purple loosestrife is harmful.

Which two details support this argument?

- 1. "All along the stream banks and up through the grasses in the meadow, a flowering plant grows from three to ten feet tall." (Paragraph 1)
- 2. "Furthermore, wildlife that depends on native plants for food and shelter suffer when purple loosestrife moves in." (Paragraph 2)
- 3. "Today, purple loosestrife grows in almost every U.S. state." (Paragraph 4)
- 4. "Its seeds are small and lightweight." (Paragraph 5)
- 5. "A breeze or the gentle current of a stream is enough to carry purple loosestrife seeds to new territory where it can vanquish native vegetation." (Paragraph 5)