



Handwriting Legibility among Elementary Students using Zaner-Bloser and Handwriting Without Tears Methods

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Handwriting remains an indispensable skill for elementary students, contributing to motor and cognitive development, as well as academic achievement. However, many students continue to struggle with handwriting legibility. In recent years, instructional approaches like Zaner-Bloser and Handwriting Without Tears have garnered attention for their structured, systematic methods aimed at enhancing handwriting skills. Therefore, the present study investigated the impact of using the Zaner-Bloser and Handwriting Without Tears handwriting instruction techniques on elementary students through a structured intervention, involving direct instruction and practice, with 34 fourth-grade students from Hongtsho Primary School. Guided by action research approach, the pre-test/post-tests and close-ended interviews were used to collect the data. The intervention consisted of daily handwriting practice sessions over 30 days, focusing on proper letter formation, spacing, and legibility. The quantitative data was analyzed using SPSSv25 and qualitative data were analyzed using the thematic analysis of Braun and Clarke (2006). Quantitative findings showed a significant improvement in handwriting legibility, with mean scores increasing from 38 (SD = 1.54) in the pre-test to 135 (SD = 1.26) in the post-test. Moreover, the paired samples t-test confirmed the statistical significance of this improvement ($t(33) = -10.97$, $p < .001$), with a large effect size of .86. Further, qualitative findings revealed that most students perceived the handwriting instruction techniques as effective and beneficial, though a few found them tedious. The action research concludes with practical implications.

Keywords: fourth-grade, handwriting legibility, handwriting instruction technique, Hongtsho primary school

INTRODUCTION

Handwriting refers to writing by hand using a pen, pencil, or other writing instrument. It is a form of communication and expression used by humans for thousands of years.

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Pal et al. (2012) define handwriting as a method aimed at communicating with others through a prevalent knowledge of signs, called characters and letters in languages. Handwriting can widely vary from person to person, and each individual's handwriting is often unique and identifiable. In Bhutan, handwriting is still considered both a means of communication and a necessary life skill the students must master in writing a letter, completing an application form, or writing a cheque. Handwriting is still the most immediate form of graphic communication. Despite the use of digital technology, the students in the classroom still engage in handwriting exercises such as writing notes, writing classwork/ homework, and writing a leave application. Namgyal (2021) states that students must practice legible and correct letter formation in primary school as children will have to write major assignments and examinations in the later part of their learning process.

In this regard, it is important to pay attention to students' handwriting because children's handwriting in lower grades is the foundation for higher grades. Feder and Majnemer (2007) mentioned that children spend 31-60% of their school time engaging in writing and other fine motor tasks. The researchers mentioned that illegible handwriting can create a barrier to accomplishing higher-order skills such as spelling and comprehension. Thus, the development of handwriting is not only important in building a child's self-esteem but is considered an essential ingredient for success in school. Many previous studies have emphasized the continuing importance of handwriting instruction in lower grades, emphasizing its critical role in cognitive development and academic performance. For instance, Dinehart and Manfra (2015) demonstrated that early handwriting skills are closely linked to later academic achievement, particularly in reading and mathematics, with proficient students performing better on standardized tests. Additionally, James and Engelhardt (2012) explored the neural implications of handwriting in young children, finding that handwriting practice activates brain regions associated with literacy and cognitive functions, thereby enhancing learning and memory. Further, Medwell and Wray (2014) examined the impact of digital versus traditional handwriting instruction, revealing that students practicing traditional handwriting outperformed those using digital tools in writing fluency and comprehension.

The importance of handwriting is especially pronounced in lower grades, where students' writing proficiency underpins their learning journey. Moreover, recent studies have highlighted the crucial role of handwriting in lower grades, particularly in kindergarten and primary school (Bonneton-Botté et al., 2023). A study by Ray et al. (2022) has found that handwriting proficiency in kindergarten students significantly impacts literacy skills such as writing composition, spelling, word reading, and phonological skills. Additionally, interventions focusing on handwriting fluency have been found to enhance writing fluency in K-6 students, emphasizing the importance of teaching different handwriting programs to improve writing skills (Lopez-Escribano et al., 2022). Furthermore, studies have indicated that handwriting quality and speed improve across primary school years, with a small percentage of children showing unsatisfactory handwriting by the end of primary school, underscoring the need for continued explicit teaching of handwriting despite the prevalence of technology in education (Duiser, 2023; Sze & Southcott, 2020). Moreover, gender and grade

differences in handwriting performance among school children have been observed, highlighting the importance of regular screening to address handwriting difficulties early on (Adams & Simmons, 2019).

In light of these findings, this action research (AR hereafter) aims to investigate the effectiveness of handwriting instruction techniques such as Zaner-Bloser and Handwriting Without Tears (HWT) on fourth-grade students' writing legibility at Hongtsho Primary School. As fourth-graders are the central point of foundation for a better bridge in the higher grades, they must build better handwriting legibility right now. In addition, this study also includes the gathering of students' perceptions through a close-ended interview, on the impact of the implementation of handwriting instruction techniques and how much it helped to improve their handwriting. Further, the findings of this research are significant for teachers, students, parents, and policymakers, as they identify effective handwriting instruction methods, leading to improved teaching strategies and academic outcomes. Additionally, the research informs early childhood education and shapes policies to ensure effective handwriting instruction. Specifically, this AR aimed to address the following research objectives and research questions:

Research Objectives

1. To investigate the impact of handwriting instruction technique on fourth-grade students' writing legibility.
2. To explore students' perception of the impact of handwriting technique on fourth-grade students' writing legibility.

Research Questions

1. To what extent does handwriting instruction technique improve the writing legibility of fourth-grade students?
2. What are students' perceptions of the handwriting instruction technique on the writing legibility of fourth-grade students?

Literature Review

The practice of handwriting instruction techniques in schools seemed to prevail ever since the establishment of literacy skills in the school curriculum. Alongside, listening/speaking and reading, handwriting can also play an important role in the academic performance of the students. Handwriting plays a critical role in the early grades, influencing spelling efficiency and temporal course (Bonneton-Botté et al., 2023; Gosse et al., 2021; Pontart et al., 2013). It is a complex activity that involves both lower-level skills like motor skills and higher-order cognitive processes (Lopez-Escribano et al., 2022). Teaching different handwriting interventions has been shown to significantly enhance writing fluency in students, especially when focusing on timed transcription skills, multicomponent treatments, and performance feedback (Kim et al., 2021). Weak handwriting skills can hinder academic success, leading to students being perceived as lazy or unmotivated (Worthington, 2011). Middle-grade students lacking proficiency in handwriting may not receive explicit instruction to improve, highlighting the importance of early identification and instructional guidance for enhancing

handwriting legibility, fluency, and formatting in school settings (Lopez-Escribano et al., 2022; Worthington, 2011). Therefore, emphasizing handwriting skills in lower grades is essential for overall academic development and success.

According to Graham (1992), teachers need to provide handwriting instruction for students to establish the habits and patterns that facilitate the development of legible and fluent writing. This includes teaching students an efficient pattern for forming individual letters, including modelling the formation of each letter, providing practice, encouraging self-evaluation, and giving feedback (Graham, 1992). Graham also mentions that teachers also need to make sure that students develop a reasonable grip for holding a pen or pencil as well as learn how to properly position the paper they are writing on. Once a letter is introduced, students should spend a short time carefully practicing how to form the letter, receive help as needed, and evaluate their efforts. Individual letters should also be reviewed periodically to reinforce the method for forming the letter and to provide additional practice and correction as necessary.

Recent studies on handwriting programs have continued to explore various instructional models and strategies to enhance handwriting skills among students. Bonneton-Botté (2020) found that integrating digital tablets and apps with traditional handwriting practice improved students' engagement and handwriting quality. Moreover, Supriatna and Ediyanto (2021) demonstrated that multisensory techniques, such as using textured surfaces and incorporating physical movement, significantly improved handwriting legibility and speed in children with learning disabilities. Research by Graham et al. (2020) showed that consistent and structured handwriting practice positively influenced reading and writing skills, indicating a strong link between fine motor skills and literacy development. Likewise, Fox (2023) highlighted that specialized training for teachers in handwriting techniques resulted in better student handwriting performance. Further, Lopez-Escribano et al. (2022) suggested that handwriting activities enhance memory, attention, and fine motor coordination in young children. Over the years, numerous handwriting programs have come into place. Such programs included direct instructional models where teachers modelled discussion of letter characteristics, and gave feedback to students (Graham et al., 2000). Other strategies included air tracing, wet sand, and drawing on each other's backs (Donica, 2015). Some of the widely used handwriting curricula include Zaner-Bloser and HWT.

Zaner-Bloser

The Zaner-Bloser handwriting curriculum, established in the early 1900s, has long been a cornerstone in handwriting education, particularly in the United States. It was designed to help students develop strong handwriting skills that will serve them well throughout their education and beyond. The Zaner-Bloser method teaches both manuscript (printing) and cursive handwriting. It begins with manuscript writing to help students learn letter formation and progresses to cursive writing once they have developed sufficient skill. The method emphasizes the correct formation of individual letters and places importance on proper letter size, shape, and slant. The Zaner-Bloser method also promotes consistency in letter size and spacing between letters and words, introducing simple spacing rules: one finger width between words and two finger

widths between sentences (Zaner-Bloser, 2003b). This method is popularly known for its structured approach, the program emphasizes the development of fine motor skills and proper letter formation through a sequential and systematic method. Zaner-Bloser incorporates multisensory techniques, such as visual, auditory, and kinaesthetic learning, to reinforce letter shapes and strokes. The curriculum offers a range of materials, from workbooks to digital resources, to cater to diverse learning styles and needs. Research has shown that the Zaner-Bloser method not only improves handwriting legibility and fluency but also supports literacy development by enhancing students' ability to read and write efficiently (Zaner-Bloser, 2003b). Its well-rounded approach, combining traditional practices with modern educational tools, continues to make Zaner-Bloser a widely adopted and effective program in schools across the United States. Lam et al. (2024) conducted a study on effectiveness of Zaner-Bloser handwriting on third-grade handwriting proficiency in Alabama. They found that there was a positive and statistically significant correlation between the adoption Zaner-Bloser and the proficiency of learners. Further, schools that adopted Zaner-Bloser products more extensively showed higher proficiency rates in handwriting among students.

Handwriting Without Tears

HWT is one of the widely used handwriting curricula in educational settings, including schools and home-schooling environments (Donica, 2010). Developed by occupational therapist Jan Z. Olsen, the program emphasizes a multisensory approach, integrating visual, auditory, tactile, and kinaesthetic learning styles to enhance student engagement and mastery of handwriting skills (Woodward & Swinth, 2002). This method is also used by occupational therapists and parents looking to help children and individuals of all ages improve their handwriting skills engagingly and effectively. The HWT curriculum utilizes a variety of innovative tools and activities, such as wooden letter pieces, slate chalkboards, and workbooks with clear, step-by-step instructions. The curriculum is structured to progress from simple to complex tasks, ensuring that students build a strong foundation in both print and cursive writing.

According to Olsen (2003), the HWT method consists of three stages: firstly, students imitate movements the teacher is completing; secondly, students look at a sample and copy letterforms; and in the third stage, students write letters independently without a model. Research has shown that HWT not only improves handwriting legibility and fluency but also supports overall literacy development by reinforcing fine motor skills and letter recognition. This method of handwriting instruction is well-known for its child-friendly and multisensory approach to teaching handwriting (Donica, 2015; Randall, 2018). Teachers and occupational therapists appreciate the program's user-friendly design, comprehensive resources, and evidence-based strategies, making it a preferred choice in schools and clinics worldwide.

Students' Perceptions of the Handwriting Instruction Technique

Research on students' perceptions of handwriting instruction techniques, specifically Zaner-Bloser and HWT, reveals diverse opinions on their effectiveness in improving writing legibility (Benson et al., 2010). The Zaner-Bloser method, known for its

traditional approach and emphasis on muscle memory through repetitive practice, is often praised for its structured progression from print to cursive (Zaner-Bloser, 2003b). Studies suggest that students appreciate the clear guidelines and systematic reinforcement, which contribute to more legible handwriting (Graham & Weintraub, 1996). In contrast, the HWT program, designed to minimize frustration through simplified letter forms and multisensory activities, receives favourable feedback for its user-friendly approach (Donica, 2015). Students report enjoying the less rigid and more engaging activities, which can reduce anxiety and improve legibility for those who struggle with fine motor skills (Olsen & Knapton, 2008). Comparative studies indicate that while both methods have their merits, student preference can significantly influence outcomes; those who thrive in a structured environment may prefer Zaner-Bloser, whereas those needing a more relaxed approach may benefit from HWT (Bray et al., 2022; Pfeiffer et al., 2015; Randall, 2018). Ultimately, the perceived effectiveness of these techniques on writing legibility is shaped by individual student needs and learning styles.

Context of the Study

Considering the importance of handwriting for students, a situational analysis was carried out in Hongtsho Primary School (HPS), particularly on fourth-grade students. The school is located in Bhutan, a country in Southeast Asia that has received scant scholarly attention (Rigdel & Thapa, 2024). There are 34 students in fourth-grade, making the highest number of enrolments in the school. Due to the huge number of students in the class, teachers have found it challenging to maintain a consistent check on the writing legibility of these students in almost all the subjects. In addition, it was also found that these students have been facing a difficult time engaging in large writing activities, unlike the ones in their former grades. When they reached fourth-grade, they had to study an additional subject, which meant they had to engage in more writing activities. The idea of the lack of handwriting legibility of all fourth-grade students stood as a point of concern for both students' academic performance and teachers' role as a facilitator. Every subject teacher in fourth-grade, had ascertained the prevalence of this concern. Hence, this AR was carried out to implement a handwriting instruction techniques and its impact on the writing legibility of fourth-grade students.

METHOD

Research Design

The present study was an action research. According to Mertler (2021), the main goal of AR is to address local-level problems in practice with the anticipation of finding immediate answers to questions or solutions to those problems. Furthermore, the conduct of AR improves education by incorporating change and involving educators working together to improve their practices. Since educators are integral members of the research process, it is practical and relevant, allowing educators direct access to research findings, and it focuses on critical reflection about professional practice (Mertler, 2021).

AR was chosen as the design for this study because it allows for a practical, iterative, and participatory approach to investigating and improving educational practices directly within the classroom setting. This design is particularly well-suited for addressing the specific, context-bound challenges faced by the fourth-grade students at HPS regarding handwriting legibility. By involving teachers actively in the research process, AR fosters a collaborative environment where educators can implement, observe, and refine instructional techniques in real-time, ensuring that the interventions are tailored to the students' unique needs and learning contexts.

Additionally, AR is valuable for its dual focus on improving practice and generating knowledge. It enables the researchers to not only assess the immediate impact of the handwriting instruction techniques on students' writing skills but also to develop a deeper understanding of the instructional methods that are most effective in enhancing handwriting legibility. Figure 1 shows the cyclical nature of AR - planning, acting, observing, and reflecting - facilitates continuous improvement and adaptation of teaching strategies, leading to more meaningful and sustainable educational outcomes (Kemmis & McTaggart, 1988). This design also empowers teachers by involving them in the research process, promoting professional development, and encouraging reflective practice (Hine, 2013).

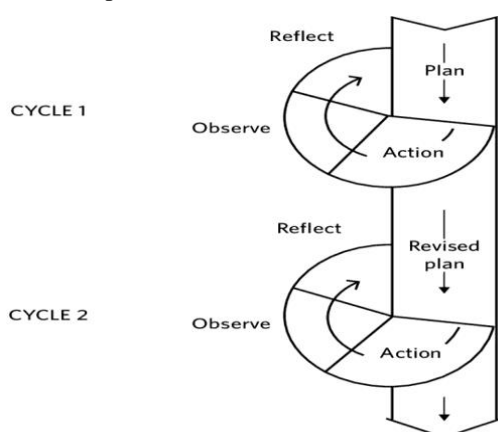


Figure 1
Kemmis & McTaggart Model, 1988

Research Participants and Setting

The participants were selected for this study through a convenience sampling method which include 34 students in fourth-grade at HPS under Thimphu District. As the school has only one section of fourth-grade students, all 34 students were chosen as the study population. According to Creswell and Creswell (2018), convenience sampling is a non-probability sampling process in which the sample is chosen based on the researcher's judgment, allowing for a representative sample while saving time and resources. In fourth-grade, students face a curriculum shift from studying three main subjects (English, Mathematics, and Dzongkha) in grades PP-III to an expanded syllabus that

includes two additional subjects (Science and Social Studies). This increase in subjects requires more writing activities, necessitating better handwriting legibility. To implement the handwriting instruction technique, all the teachers of the fourth-grade subjects (English, Mathematics, Social Studies, Science, and ICT) were involved in guiding the students' writing process.

Research Instruments

The present study utilized two research instruments to collect the data. The primary instrument was a handwriting legibility test adapted from Zaner-Bloser and Handwriting Without Tears. This test was modified for both pre-test and post-test use. The test consists of 26 alphabets, 26 words, a sentence, and a longer paragraph consisting of all the alphabets. The longer paragraph consists of 66 words. The total score for both the pre-test and post-test was 50, assessed based on five criteria: letter formation, spacing, consistency, neatness, and legibility. Each category was evaluated out of a total score of 10. Additionally, the study aims to explore students' perceptions regarding the implementation of handwriting instruction techniques. To gather their opinions, a close-ended interview was conducted with 15 randomly selected students. The researchers developed five interview questions based on the research objectives (see Appendix C). Both the handwriting legibility test and the close-ended interview questions were assessed for reliability and validity. The pre-test and post-test questions were validated by three experts using the Item Objective Congruence (IOC) method (Turner and Carlson, 2003), yielding an average IOC of 0.96, indicating the items' validity for the study as this value exceeded 0.75. The close-ended questions were reviewed by two qualitative research experts and pilot-tested, leading to potential modifications based on expert feedback and pilot analysis. It is important to note that the results from the pilot analysis were not included in the final analysis.

Data Collection Procedure

First, approval was sought from the school leader. Then, researchers obtained informed consent from parents since the students were young, and finally, consent was obtained from all participants. This ensured that everyone who participated in the study gave their consent. The entire data collection process took researchers a month. The first round of data is gathered through conducting a pre-test for 40 minutes. After that, students were provided and guided through handwriting instruction techniques for a period of 30 days. Teachers and students convened daily for 40 minutes to focus on handwriting instruction. During the implementation procedure, every Tuesday, the teacher demonstrated the correct way of letter formation, spacing between the words, and space between the sentences through a sample displayed on the wall. A team of five teachers participated in evaluating the students' handwriting. On other days of the week, in each subject, teachers collected handwriting samples from the students, which included 26 alphabets, 26 words, a sentence, and a longer paragraph of 66 words. Students were given 20 minutes to copy these samples into their notebooks, and then continued this practice as homework. The same samples were used every day for 30 days. Post-test data was collected using the same instruments as in the pre-test.

Intervention Procedure

Pre-intervention phase

All fourth-grade students were involved in regular handwriting activities as part of their curriculum. Before implementing the handwriting instruction techniques, a pre-test was conducted to establish a baseline for each student's handwriting legibility. The test included: Writing all 26 alphabets in both upper and lower case, writing 26 common words, writing a sentence containing all 26 alphabets, and writing a longer paragraph. The handwriting samples were evaluated based on letter formation, spacing, consistency, neatness and overall legibility using a computer program designed to measure handwriting legibility.

Intervention phase

For one month, students engaged in daily handwriting practice sessions, focusing on proper letter formation, spacing, and overall legibility. Each session lasted approximately 40 minutes and was conducted during various subjects to ensure consistent practice. The instructional methods implemented during the intervention included several key approaches. Teachers modelled the correct formation of each letter, providing both visual and verbal guidance to the students. During guided practice, students wrote under the supervision of their teachers, who offered immediate feedback and corrections. Independent practice sessions allowed students to reinforce the skills they had learned by practicing writing on their own. Additionally, multi-sensory techniques (Supriatna & Ediyanto, 2021; Zaner-Bloser, 2003b) were incorporated to enhance learning, such as air tracing, using tactile surfaces like sandpaper letters, and engaging in interactive activities.

The materials used in the intervention included worksheets with structured writing exercises, handwriting guides, and lined paper to assist with proper letter formation and spacing. Additionally, tools such as pencils, erasers, and pens appropriate for handwriting practice were provided to ensure students had the necessary resources for effective handwriting improvement. Moreover, teachers provided regular feedback on students' handwriting, highlighting areas of improvement and providing positive reinforcement. Students were encouraged to self-evaluate their handwriting and make necessary adjustments.

Post-intervention phase

After one month of handwriting instruction, a post-test identical to the pre-test was administered to assess the impact of the intervention. The test required students to write all 26 alphabets in both upper and lower case, 26 common words, a sentence containing all 26 alphabets, and a longer paragraph. This comprehensive assessment aimed to measure any improvements in handwriting legibility and overall writing skills following the intervention. The post-test handwriting samples were assessed using the same criteria as the pre-test to ensure consistency in measuring improvements in letter formation, spacing, alignment, and overall legibility.

Data Analysis

In the first phase, the quantitative data were analysed using the Statistical Package for the Social Sciences (SPSSv25) software to determine the level of students' handwriting legibility before and after the implementation of the handwriting instruction technique. Pre-test and post-test scores for each student were entered into SPSS, focusing on letter formation, spacing, alignment, and overall legibility. Descriptive statistics, including the mean and standard deviation, were calculated for both pre-test and post-test scores, providing an average measure of handwriting legibility and indicating the variability or spread of scores around the mean. Additionally, a paired sample t-test was conducted to assess whether the observed improvements in handwriting legibility were statistically significant or insignificant. Further, Cohen's *d* (1988) was used to determine the effect size between groups for the post-test. Effect size measures the magnitude of differences between groups. Cohen's *d* represents the ratio of the difference between two means in standard deviation units. According to Cohen (1988), effect sizes can be interpreted as follows: below 0.2 indicates a small effect, 0.2 to 0.8 a medium effect, and above 0.8 a large effect.

In the second phase, thematic analysis was used to analyse the qualitative data collected through close-ended interviews with the students, aiming to gather insights into their perceptions of the handwriting instruction techniques and their subjective experiences. The qualitative data was analysed thematically using the six-step process outlined by Braun and Clarke (2006). These steps include familiarizing with the data, initial coding, identifying themes, reviewing themes, defining and naming themes, and producing the final report. The two researchers transcribed and coded the data jointly. Following initial coding, they identified, reviewed, and defined the themes. The compiled transcriptions, codes, and themes were then sent to some participants for member checking. According to Creswell and Miller (2000), member checking is crucial for establishing trustworthiness in qualitative research as it enhances the credibility of the research process.

FINDINGS

The findings of this AR are presented in two phases. Phase one encompasses the quantitative findings, while phase two utilizes qualitative data to support the quantitative findings.

Quantitative Findings

Quantitative findings indicated that there was significant improvement in students' handwriting after the post-test. Table 1 shows the finding of the descriptive statistical analysis for the sample group's achievement score in handwriting legibility. The descriptive analysis of the handwriting legibility test's pre-test and post-test results indicated a substantial improvement in scores. The mean score increased from 38 (*SD* = 1.54) in the pre-test to 135 (*SD* = 1.26) in the post-test, demonstrating a significant improvement in handwriting legibility following the intervention. The higher mean score in the post-test was the evidence that indicated the impact of handwriting

instruction techniques on the students' writing legibility. The standard deviation decreased from 1.54 to 1.26, suggesting that post-test scores were more consistent.

Table 1
Descriptive analysis of the handwriting legibility's pre-test and post-test

Tests	Mean	Standard Deviation
Pre-test	38	1.54
post-test	135	1.26

Table 2 presents the paired samples t-test results, showing a significant improvement in handwriting legibility from the pre-test ($M = 38$, $SD = 1.54$) to the post-test ($M = 135$, $SD = 1.26$), $t(33) = -10.97$, $p < .001$. The negative t-value indicates that the post-test scores are significantly higher than the pre-test scores. The p-value of .000 confirms that this difference is statistically significant, suggesting that the intervention had a strong positive effect on handwriting legibility as demonstrated by the large increase in mean scores and the reduced variability in post-test scores. The effect size, calculated using Cohen's d , was .86, indicating a large effect of the intervention (Cohen, 1988). Overall, these results suggest a strong positive impact of the intervention on handwriting legibility.

Table 2
Paired samples test for pre-test and post-test handwriting legibility

	Mean	SD	$t(33)$	p	Effect size
Pre-test	38	1.54	-10.97	.000	
Post-test	135	1.26			.86

Qualitative Findings

To understand students' perceptions of the handwriting instruction techniques, responses from a close-ended interview were analysed using thematic analysis (Braun & Clarke, 2006). The analysis revealed three key themes: perceptions, perceived benefits, and challenges.

1. Perception about Handwriting Instructions

The majority of the participants had a positive perception. Students generally perceived handwriting as important, recognizing the need for clear and legible writing in today's age. All 15 students rated the importance of handwriting in today's age as mostly 5, indicating a strong recognition of the need to improve writing legibility. While most students valued the instruction, some had mixed feelings, expressing a desire for more flexibility and less rigid rules in their handwriting practice. S3 shared,

I wish we could just write the way we want to instead of following all these rules. It is not fun sometimes.

2. Perceived Benefits

Students felt that their handwriting became more readable and visually pleasing, enhancing their pride and satisfaction. S7 expressed,

This handwriting technique helped me with correct letter formation and spacing between words. Now my notes look more readable and beautiful.

As they mastered the techniques, some students noted a quicker writing pace due to their familiarity with letter formation. S11 said,

I used to write really slow, but now I can write faster because I can correctly form the letters.

Encouragement from teachers and positive reactions from peers boosted students' confidence and motivation to improve further.

My teacher said my writing is so much better than it used to be. She said it is easy to read now, and it's really neat. My friends like my handwriting too.

Students expressed interest in participating in similar programs, showing enthusiasm for continued improvement. S14 articulated,

I am so happy that my handwriting looks very clean and beautiful, I wish to participate in similar handwriting techniques again to improve my handwriting.

3. Perceived Challenges

Some students found the repetitive drills boring and demotivating, preferring variety in their practice sessions. S8 shared,

I get tired of doing the same activity over and over, I do not prefer repeated activities, and spending time on such repeated activities bores me.

A few students faced difficulties adapting to new handwriting techniques, feeling unsure and lacking confidence due to their attachment to previous writing styles.

When I am asked to follow certain handwriting drills, I get confused and lose my confidence, maybe because I am so much used to my old writing style. But I promise to practice and improve my handwriting.

DISCUSSION

RQ1

The results of this study indicate that handwriting instruction techniques such as Zaner-Bloser and HWT methods significantly improve the writing legibility of fourth-grade students. This finding aligns with existing literature that emphasizes the importance of structured handwriting instruction in developing legible handwriting (Graham &

Weintraub, 1996; Lam et al., 2024; Olsen & Knapton, 2008). Both curricula are designed to develop strong handwriting skills through structured and systematic approaches, albeit with different methodologies. As noted by Pal et al. (2012), handwriting is a method aimed at communicating through a common understanding of characters and letters, which underscores the need for clear and legible writing.

The Zaner-Bloser curriculum emphasizes the correct formation of individual letters and consistency in letter size, shape, and spacing (Zaner-Bloser, 2003b). It employs a sequential method that integrates multisensory techniques to reinforce letter shapes and strokes, which is instrumental in improving handwriting legibility. This aligns with the importance of handwriting in Bhutan, where it remains a crucial life skill for various tasks, including writing letters and completing forms (Namgyal, 2021). The structured approach of Zaner-Bloser, with its focus on fine motor skills and traditional practices, has shown positive results in developing students' handwriting fluency and accuracy (Graham et al., 2000; Lam et al., 2024; Lopez-Escribano et al., 2022). This is particularly relevant given that handwriting serves as the foundation for higher academic achievements (Feder & Majnemer, 2007; Dinehart & Manfra, 2015).

Similarly, the HWT program, developed by an occupational therapist, uses a multisensory approach to make handwriting instruction engaging and effective (Woodward & Swinth, 2002). By integrating visual, auditory, tactile, and kinaesthetic learning styles, HWT helps students build a strong foundation in both print and cursive writing (Olsen, 2003; Donica, 2015). The three-stage process of imitation, copying, and independent writing, combined with innovative tools and activities, fosters handwriting legibility and fluency. Research supports that HWT not only enhances handwriting but also bolsters overall literacy development by improving fine motor skills and letter recognition (Donica, 2015; Lopez-Escribano et al., 2022). These findings are in line with the studies by Ray et al. (2022), which show that handwriting proficiency significantly impacts literacy skills, further highlighting the value of effective handwriting instruction.

Both methods have demonstrated significant improvements in the handwriting legibility of fourth-grade students. The structured and repetitive practice in Zaner-Bloser helps students internalize correct letter formations, while the engaging and multisensory approach of HWT reduces frustration and enhances motor skills. However, the qualitative findings indicate that some students do not enjoy the repetitive nature of the Zaner-Bloser approach, which could affect their handwriting and academic outcomes. On the other hand, the positive outcomes of these approaches underscore the importance of incorporating systematic handwriting instruction in early education to support academic success (Graham et al., 2020; Lam et al., 2024; Fox, 2023). This is consistent with the broader research indicating that handwriting quality improves across primary school years, which further supports the need for continuous instruction (Duiser, 2023; Sze & Southcott, 2020).

RQ2

The qualitative findings of the present study reveals that students generally have positive perceptions towards handwriting instruction techniques such as the Zaner-

Bloser and HWT methods. This aligns with the findings of Lam et al. (2024) and Zaner-Bloser (2003b), who found that the Zaner-Bloser method was appreciated due to its clear guidelines and structured progression from print to cursive writing. The emphasis on muscle memory through repetitive practice is valued for its role in reinforcing correct letter formations and improving legibility (Benson et al., 2010; Graham & Weintraub, 1996). Students who thrive in structured environments tend to prefer the Zaner-Bloser method, finding its systematic reinforcement conducive to developing more legible handwriting, which is essential as handwriting is foundational for higher-order skills like spelling and comprehension (Feder & Majnemer, 2007).

Conversely, the HWT program is favoured for its user-friendly and engaging approach. The integration of multisensory activities and simplified letter forms is particularly beneficial for students who struggle with fine motor skills (Donica, 2015). This approach resonates with the findings of Medwell and Wray (2014), who noted that traditional handwriting instruction can lead to better writing fluency compared to digital tools. The less rigid structure and more interactive techniques of HWT help reduce anxiety and make handwriting practice enjoyable (Olsen & Knapton, 2008). Students appreciate the variety of tools and activities, such as wooden letter pieces and slate chalkboards, which make learning to write less daunting and more accessible (Donica, 2015). This is particularly important considering that handwriting remains a critical skill for communication, despite the rise of digital technology (Namgyal, 2021).

Comparative studies indicate that student preferences significantly influence the perceived effectiveness of these handwriting instruction techniques. Those who respond well to a structured and repetitive practice environment may find greater success with Zaner-Bloser, while students who need a more relaxed and engaging approach may benefit more from HWT. Overall, the positive perceptions of both methods highlight the importance of tailoring handwriting instruction to meet individual student needs and learning styles (Bray et al., 2022; Pfeiffer et al., 2015). The success of these handwriting instruction techniques underscores the necessity of incorporating diverse and adaptable methods in educational settings to cater to the varying needs of students, thereby enhancing their academic performance and overall literacy development, as supported by the research on the critical role of handwriting in early education (Dinehart & Manfra, 2015; James & Engelhardt, 2012).

CONCLUSION AND IMPLICATIONS

This AR highlights the significant impact of structured handwriting instruction techniques on improving the writing legibility of fourth-grade students. Both the Zaner-Bloser and HWT methods demonstrated considerable effectiveness, as evidenced by substantial improvements in handwriting legibility scores post-intervention. Students' perceptions further validated these findings, with positive feedback highlighting the benefits of clear guidelines and engaging, multisensory activities. The results suggest that tailoring handwriting instruction to accommodate diverse learning styles and preferences can enhance the overall efficacy of these methods. Ultimately, incorporating well-designed handwriting instruction techniques in the curriculum is crucial for fostering legible and fluent handwriting skills, which are essential for

students' academic success. Moreover, it should be noted that handwriting instruction is most effective when accompanied by immediate corrective feedback. Fu and Li (2022) discovered that immediate feedback is more effective than delayed feedback in promoting L2 development. Similarly, Van Ha et al. (2021) found that students place a high value on receiving immediate feedback.

The findings of this study have significant implications for various stakeholders, including teachers, students, parents, and policymakers. For teachers, the effectiveness of both the Zaner-Bloser and HWT methods in enhancing handwriting legibility suggests that these approaches should be incorporated into school programs. This can lead to improved teaching strategies and better student outcomes. Additionally, ongoing professional development is essential to help educators implement and adapt these techniques effectively. For curriculum developers, the findings support the creation of standardized assessments for handwriting skills, crucial for identifying students who need additional support and for tracking progress over time. The study also highlights the importance of creating engaging and supportive learning environments that improve technical skills, reduce anxiety, and increase motivation. Parents can use these insights to help their children practice handwriting at home, particularly by integrating digital tools. Finally, the study's implications for early childhood education emphasize the role of handwriting instruction in developing fine motor skills, informing policies that ensure effective handwriting instruction in schools.

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