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Students Responses to the Chinese Hanzi Handwriting Application in Learning Hanzi Writing Skills: Evidence from Eleventh-Grade Students at SMKS Ketintang Surabaya

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A R T I C L E I N F O

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A B S T R A C T

Acquiring Chinese character hanzi writing skills remains one of the most challenging aspects of learning Chinese as a foreign language, particularly for beginner and intermediate learners, due to the complex stroke order and logographic structure of hanzi. This challenge underscores the need for interactive learning media that can support more engaging and effective hanzi instruction, such as the Chinese Hanzi Handwriting application. This study aimed to examine the effectiveness of the Chinese Hanzi Handwriting application in improving students hanzi writing skills and to investigate student's responses toward its use as a learning medium. A quantitative approach with a True Experimental Design was employed, involving 66 eleventh-grade students divided equally into an experimental group and a control group. Data were collected through classroom observations, pre-tests, post-tests, and questionnaires, and analyzed using an independent samples t-test. The t-test results revealed a statistically significant difference between the experimental and control groups ($p < 0,05$), confirming the effectiveness of the Chinese Hanzi Handwriting application in enhancing students hanzi writing skills. Furthermore, the questionnaire results showed an overall average response rate ranging from 81% to 100%, categorized as "Very Good". These findings indicate that the Chinese Hanzi Handwriting application is both pedagogically effective and well received by students, suggesting its potential as a viable interactive learning medium for hanzi writing instruction in Chinese as a foreign language classroom.

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INTRODUCTION

Language is the primary bridge in the world of education. The role of language in education is crucial and cannot be underestimated, as it provides the basic skills needed in various aspects of life, including education, work, and social interaction. Ali (2020) emphasizes that, fundamentally, education is inseparable from human life, as it helps individuals optimally develop their potential-cognitively, affectively, and psychomotorically. According to him, education enables people to acquire knowledge. Similarly, Siregar (2023) argues that 65% of students in major cities in Indonesia more frequently use foreign languages in their daily communication, particularly in educational settings and on social media.

Izzah et al. (2023) argues that a deep understanding of the characteristics of hanzi is crucial for students who wish to master Mandarin language skills. These characters often pose the primary obstacle in the learning process. This statement is further clarified by Han and Pankitwanitjalearn (2021), who note, "而同样是汉语专业的学生，有 30% 的人觉得在汉字 "听说读写" 四项技能中最难的是汉字的书写部分"。 Ér tóngyàng shì hànyǔ zhuānyè de xuéshēng, yǒu 30% de rén juédé zài hànzì "tīng shuō dú xiě" sì xiàng jìnéng zhōng zuì nán de shì hànzì de shūxiě bùfèn. This means that among students majoring in Mandarin, 30% consider writing Chinese characters to be the most difficult of the four skills. This view is supported by Hou and Jiang (2022), who note that irregular strokes can make characters difficult to read and remember, thereby hindering students' ability to use the language effectively.

Learning to write Mandarin begins with simple and easy tasks and progresses to the most complex ones. As demonstrated by Zhou and Li (2022), the process starts with learning to recognize various strokes and radicals, followed by combining several strokes into a single character known as a hanzi. The final stage involves learning Mandarin words consisting of one, two, or more characters. Not only can it confuse readers if someone writes hanzi characters in the wrong order or with incorrect strokes, but it can also lead to the habit of writing without following the correct rules. This habit can become ingrained and carry over to higher levels of learning, potentially leading to poor study habits. These issues will result in: (1) difficulty in remembering and memorizing hanzi characters; (2) hanzi characters becoming difficult for readers to read and recognize, causing significant confusion when they see them; (3) difficulty using digital Hanzi dictionaries because if the stroke order does not conform to the standard, the system cannot recognize the character the writer intends, making searches more difficult and time-consuming; (4) negative effects on advanced Hanzi learning; (5) difficulty writing quickly and efficiently.

The era of the Fourth Industrial Revolution demands the use of technology in the learning process within the education sector, particularly in learning media (Tianggara and Mintowati, 2026). These findings align with the views of Dita and Fanani (2026), who state that technological advancements can assist teachers in utilizing various types of learning media, one of which is the use of digital applications that provide a wide range of learning resources such as videos, audio, and interactive, engaging e-books to help students expand their

understanding of the learning material. In the field of education, we all know that education worldwide is moving toward the use of technology. Meanwhile, there have been developments in web-based applications and interactive games specifically designed for learning hanzi, which have also been proven to improve students writing skills, such as "Design and Development of an Android-Based Mandarin Character Learning Application for Preschool Children" by Budhi et al. (2016). Nevertheless, such studies have yet to sufficiently examine applications that specifically integrate Hanzi character writing skills with technology and focus on vocational high school (SMK) students; thus, there remains room for the development of Chinese Hanzi Handwriting applications better suited to the needs of SMK students in Indonesia. This indicates that the use of mobile applications in foreign language learning can enhance student motivation and learning outcomes.

The researchers selected the Chinese Hanzi Handwriting app as the medium used in this study. This app offers various features that support Mandarin language learning, particularly the skill of writing hanzi. The features available in the Chinese Hanzi Handwriting app can make the teaching and learning environment more engaging and increase student participation in absorbing the material presented by the teacher. This is supported by the findings of researchers Ilawati and Suroso (2025), who state that technology-based learning apps can significantly improve students writing skills. In addition to having a significant positive impact on writing ability, the learning app also addresses aspects such as the completeness of ideas, coherence, grammar, and vocabulary usage. With visualization features and repetitive practice, students can more easily remember and write Hanzi characters correctly. If students use this app, they will experience a significant improvement in their writing skills compared to traditional learning methods. Numerous studies on the effectiveness of learning apps for writing hanzi characters have been conducted using various technological approaches. Several studies, such as research on the use of mobile learning apps in hanzi writing instruction, have shown that digital apps can significantly help students master the basic strokes and writing sequences of characters. Previous researchers have also discussed the "Application of the 'Teman Jepang' Project-Based Learning Method Through the Use of the HelloTalk! for Japanese Writing Instruction" by Hermawan and Amri (2022). Furthermore, this method is known to be highly effective in increasing students' interest in learning.

Vocational High Schools (SMK) are formal educational institutions at the secondary level that focus on the development of skills and expertise (Aditya and Kencana, 2024). Some time ago at SMKS Ketintang in Surabaya, the researcher conducted a mandatory campus activity known as PLP (Introduction to the School Environment), which took place over four months during the even semester. This activity served as the final requirement before undertaking the final writing course and was also a graduation requirement for students in the education program. For this activity, the researcher was interested in using this school as the research subject because it offers Mandarin language instruction. Based on observations and interviews with Mandarin language teachers at SMKS

Ketintang Surabaya, several issues were identified in the learning process: (1) many students still do not understand the proper method for writing hanzi characters, as evidenced by their homework assignments, which often contain blank answers, incorrect character order, and inaccurate hanzi writing. This issue formed the basis for this study, as previous instruction had been limited to teaching the basics of Mandarin in 10th grade, thus not placing much emphasis on mastering Hanzi writing; (2) a lack of student interest in the Mandarin language subject, resulting in the material presented by teachers not being effectively conveyed; (3) students find learning Mandarin very difficult, especially when it comes to writing Hanzi, due to a lack of engaging learning materials. Based on these findings, the researcher selected students as the subjects of this study.

LITERATURE REVIEW

A relevant previous study was conducted by Fauzia (2023) from the Faculty of Languages and Arts, Universitas Negeri Surabaya, entitled "The Effectiveness of Using Pleco (M-Learning) Media in Hanzi Writing Skills among Eleventh-Grade Students of SMA Dharma Wanita Surabaya in the 2022/2023 Academic Year" This study shares similarities with the present research in examining the effectiveness of digital learning applications for improving hanzi writing skills and evaluating students responses to their implementation. However, the current study focuses specifically on the use of the Chinese Hanzi Handwriting application and employs different data analysis techniques. Fauzia's findings demonstrated that the use of the Pleco application had a positive impact on students hanzi writing skills, as evidenced by the statistical result showing that the obtained t-value was higher than the critical t-value (8,902 ≥ 2,391). Furthermore, students expressed highly positive responses toward the application, with questionnaire scores ranging from 81% to 100%, indicating a "Very Good" category.

Another relevant study was conducted by Pratama (2020) from the Faculty of Letters, Universitas Negeri Malang, entitled "The Effectiveness of the Du Chinese Application in Improving Hanzi Writing Skills among Tenth-Grade Students of SMA Negeri 10 Malang" Using a quantitative experimental approach with a pre-test and post-test control group design, the study aimed to investigate the effectiveness of the Du Chinese application in enhancing students hanzi writing skills. Similar to the present research, the study examined both the effectiveness of the instructional medium and students responses toward its use. Nevertheless, the two studies differ in terms of the learning application employed and the analytical procedures applied. Pratama reported that 87% of students responded positively to the application due to its interactive features, ease of use, and ability to facilitate understanding of hanzi stroke order. The t-test results (t = 4,62 ≥ 2,00) further confirmed the effectiveness of the application as a digital learning medium for hanzi writing instruction.

A third relevant study was conducted by Herlina (2023) from the Mandarin Language Education Program, Faculty of Languages and Arts,

Universitas Negeri Surabaya, entitled "Development of the 彩虹字笔顺 Cǎihóng Zì Bǐshùn Media for Hanzi Writing Instruction among Eleventh-Grade ULP Students at SMK Negeri 6 Surabaya." Unlike the studies conducted by Fauzia (2023) and Pratama (2020), which focused on evaluating the effectiveness of digital applications, Herlina's research concentrated on the development and validation of instructional media. Despite this difference, all three studies shared the common objective of supporting hanzi writing instruction. The findings indicated that the developed media achieved validation scores of 80% from material experts and 82% from media experts. In addition, students responses to the use of the 彩虹字笔顺 Cǎihóng Zì Bǐshùn media reached 86%, which was categorized as "Very Good," suggesting that the media was valid and appropriate for use in Chinese language learning, particularly in hanzi writing instruction.

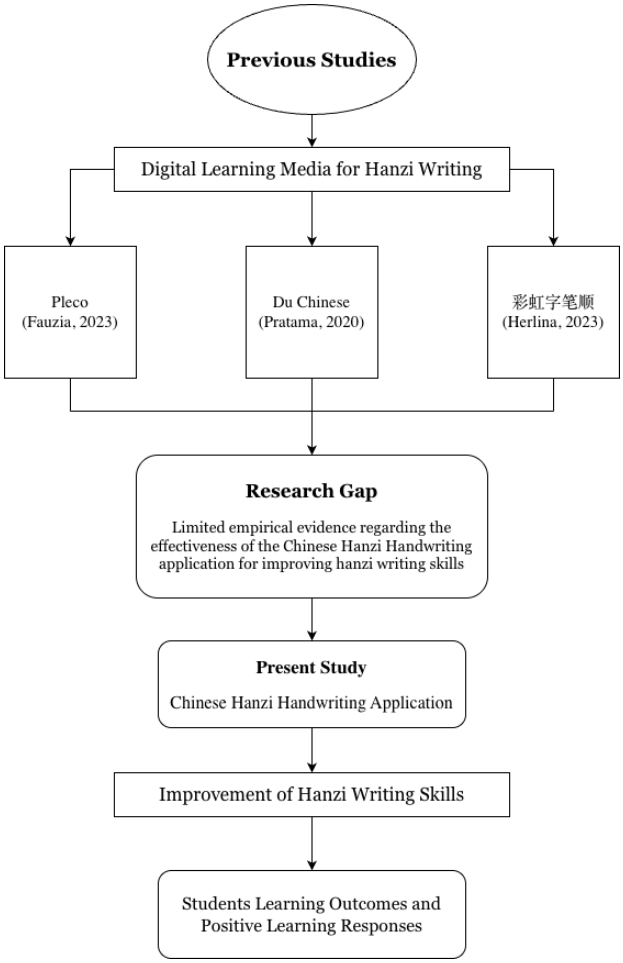

Figure 1. Conceptual Framework

Learning Media

Learning media play a significant role in facilitating the teaching and learning process. According to Selamet et. al (2025), diverse and integrated learning media not only support the achievement of students academic competencies but also contribute to the development of character, creativity, and learner autonomy. The term media originates from the word medium, which

refers to an intermediary or channel for transmitting messages. In educational contexts, learning media encompass any tools, resources, or technologies used to convey information and instructional content from teachers to students. These may include conventional media, such as textbooks, whiteboards, and teaching aids, as well as digital media, including educational applications and software.

In the current digital era, learning media have become increasingly important in enhancing educational quality and improving learning effectiveness. The appropriate selection and utilization of learning media enable teachers to adapt instructional practices to students learning needs, levels of understanding, and learning preferences, thereby facilitating the achievement of learning objectives. Maharani et al. (2024) defines learning media as tools or facilities used to deliver instructional materials and emphasizes that effective learning media not only assist teachers in presenting content but also help students comprehend concepts more efficiently.

Similarly, Wahidin (2025) argues that learning media should be aligned with students characteristics and learning needs to create effective learning experiences and optimize learning outcomes. In contrast, Sari et al. (2023) suggest that learning media tend to emphasize training-oriented activities rather than broader educational processes, focusing primarily on information delivery and practical skill development. Despite these differing perspectives, learning media can generally be understood as instructional resources that function as both sources of learning and channels for communication during the learning process. Consequently, the effective use of learning media may significantly influence the attainment of intended learning outcomes.

Hanzi Writing Skills

In Chinese language learning, writing is referred to as 书写 shūxiě. Unlike alphabetic writing systems such as Indonesian, which consist of twenty-six letters, Chinese employs a logographic writing system in which characters represent meaning rather than individual sounds. According to Zhang et al. (2022), Chinese characters hanzi are part of a logographic writing system that distinguishes Chinese from alphabet-based languages. Consequently, mastering hanzi writing is often considered one of the most challenging aspects of learning Chinese as a foreign language.

Song et al. (2025) “而汉字作为一种典型的表意文字，其每个字符均蕴含丰富的语义信息，通过象形、指事、会意、 形声等多种造字法，实现了对事物、概念及情感的直观表达”。Ér hànzì zuòwéi yī zhǒng diǎnxíng de biǎoyì wénzì, qí měi gè zìfú jūn yùnhán fēngfù de yǔyì xìnxī, tōngguò xiàngxíng, zhǐ shì, huìyì, xíngshēng děng duō zhǒng zào zì fǎ, shíxiànle duì shìwù, gàiniàn jí qínggǎn de zhíguān biǎodá. It means, explains that Chinese characters are a typical ideographic writing system in which each character contains rich semantic information. Through various character formation methods, including pictographic, indicative, associative, and phonosemantic principles, Chinese characters enable the representation of objects, concepts, and emotions in a highly meaningful manner. This characteristic is consistent with the view of Khusni and Amri (2021), who emphasize that Chinese differs from Indonesian

because it does not rely on alphabetic letters but instead uses hanzi characters accompanied by four distinctive tones (shēngdiào).

Hanzi writing involves the accurate production of Chinese characters according to established stroke-order conventions. Mastery of hanzi writing enables learners to improve character recognition, vocabulary retention, and overall comprehension in Chinese language learning. The fundamental functional units of Chinese characters consist of radicals and strokes, both of which play crucial roles in character formation and identification.

According to Zhu et al. (2023) “笔画是汉字结构和识别的最小单元”。Bǐhuà shì hànzì jiégòu hé shìbié de zuìxiǎo dānyuán. It means, strokes (bǐhuà) represent the smallest structural and recognition units of Chinese characters. Chinese characters are formed through systematic combinations of these strokes, following standardized writing conventions that have evolved over a long historical period. Similarly, Dasion et al. (2023) states that hanzi serve as the writing system used to represent words, phrases, sentences, and paragraphs in Chinese. The Chinese writing system includes ten basic stroke forms, which constitute the foundation of character construction. As noted by Suparto (2002), these stroke patterns have been preserved and standardized through centuries of social and cultural development among the Han people.

Given the structural complexity of Chinese characters, mastery of hanzi writing requires learners to understand character composition, stroke order, and radical structures. Therefore, systematic practice and appropriate instructional media are essential for helping learners develop effective hanzi writing skills and achieve greater proficiency in Chinese language learning.

METHODOLOGY

This study employed a quantitative experimental approach to examine the effectiveness of the Chinese Hanzi Handwriting application in improving students hanzi writing skills. Experimental research is a method used to investigate the effects of a particular treatment or intervention on a dependent variable under controlled conditions (Sugiyono, 2015). This approach was considered appropriate because the primary objective of the study was to determine the effect of the Chinese Hanzi Handwriting application as a learning medium and to evaluate its effectiveness in enhancing students hanzi writing performance.

The research adopted a True Experimental Design, specifically a pre-test–post-test control group design. According to Sugiyono (2018), this design involves two groups that are assessed before and after the implementation of a treatment, allowing researchers to identify differences between the experimental and control groups and to measure the impact of the intervention more accurately. In this study, the experimental group received instruction using the Chinese Hanzi Handwriting application, whereas the control group was taught through conventional instructional methods without the use of the application.

The population of this study comprised all eleventh-grade students at SMKS Ketintang Surabaya who were enrolled in Mandarin language courses.

The participants were drawn from five vocational study programs, namely Education Management (MP), Digital Business (BD), Visual Communication Design (DKV), Computer and Network Engineering (TKJ), and Accounting (AK). Collectively, these programs consisted of 17 classes with a total population of 575 students. This population served as the basis for sample selection and provided the context for examining the effectiveness of the Chinese Hanzi Handwriting application in enhancing students hanzi writing skills.

Table 1. Distribution of the Research Population

No.	Study Program	Number of Classes	Number of Student
1.	MP	5	166
2.	DKV	3	98
3.	TKJ	4	142
4.	BD	2	66
5.	AK	3	103

The sample was selected using the Cluster Random Sampling technique. The randomization process was conducted through the Wheel of Names online platform to ensure an equal probability of selection among the available classes. Based on the random sampling results, Class XI BD II, consisting of 33 students, was assigned as the experimental group, while Class XI DKV II, consisting of 33 students, was designated as the control group. Therefore, the total sample involved in this study comprised 66 eleventh-grade students.

Two research instruments were employed in this study, namely tests and questionnaires. The test instrument consisted of a pre-test and a post-test administered to both the experimental and control groups to measure students hanzi writing skills before and after the instructional intervention. In addition, a questionnaire was administered exclusively to the experimental group at the end of the study to collect data regarding students perceptions and responses toward the use of the Chinese Hanzi Handwriting application in hanzi writing instruction.

According to Sugiyono (2018), a questionnaire is a data collection instrument consisting of a set of written statements or questions designed to obtain information from respondents. The questionnaire used in this study comprised ten statements related to students experiences of learning hanzi writing through the Chinese Hanzi Handwriting application. Respondents were required to select one of the predetermined response options provided by the researcher.

This study employed the Chinese Hanzi Handwriting application as an instructional medium to enhance students hanzi writing skills. The application was implemented exclusively in the experimental group. To examine students responses toward the use of the application, a questionnaire consisting of 10 statement items was administered to students in Class XI BD II. The questionnaire data were analyzed using percentage-based calculations for each item. The questionnaire was designed to measure students perceptions and responses regarding the use of the Chinese Hanzi Handwriting application in learning hanzi writing. The analysis of the scores for each questionnaire item is

presented below. Following the analysis of the student response questionnaire data, the percentage of responses for each questionnaire item was calculated using the following formula:

$$P = \frac{f}{n} \times 100\%$$

$$P = \frac{obtained\ score}{maximum\ score} \times\ 100\%$$

The questionnaire employed a four-point Likert scale consisting of Strongly Agree (4), Agree (3), Disagree (2), and Strongly Disagree (1). After data collection, the responses were analyzed by calculating the percentage scores and mean values for each item to determine students overall perceptions of the application. As noted by Riduwan (2017), the Likert scale is widely used to measure individuals' attitudes, opinions, and perceptions toward a particular phenomenon through a series of structured statements. Accordingly, the questionnaire data provided supporting evidence regarding the acceptance and practicality of the Chinese Hanzi Handwriting application as a learning medium for improving hanzi writing skills.

RESULT AND DISCUSSION

Prior to the implementation of the study, instructional modules were developed as learning instruments for both the experimental and control groups. These modules were designed to ensure the alignment of learning materials, learning objectives, and instructional procedures, while distinguishing the treatment administered to each group. The experimental group received instruction supported by the Chinese Hanzi Handwriting application, whereas the control group was taught using conventional methods assisted by PowerPoint presentations. This approach is consistent with the view of Soleha et al. (2025), who argue that instructional modules provide clear guidance for achieving learning outcomes and assist teachers in designing appropriate learning activities and assessment strategies.

The research procedure began with the administration of a pre-test to students in both the experimental and control groups. The pre-test was intended to assess students' initial hanzi writing abilities and to determine their baseline proficiency before the instructional intervention was implemented. Following the pre-test, students in the experimental group received instruction on hanzi writing through the Chinese Hanzi Handwriting application, while students in the control group participated in conventional classroom instruction using a lecture-based approach supported by PowerPoint materials.

Prior to the learning activities, the teacher established a conducive learning environment to facilitate effective classroom interaction. The Chinese Hanzi Handwriting application was then introduced as the primary instructional medium. Students were instructed to access their smartphones and download the application. After the installation process was completed, worksheets containing vocabulary exercises and hanzi writing tasks related to the topic of

hobbies were distributed. The learning materials were aligned with the content previously studied through the prescribed textbook.

Throughout the instructional process, students demonstrated a high level of engagement and enthusiasm. This observation suggests that the integration of the Chinese Hanzi Handwriting application contributed positively to students learning experiences and increased their interest in learning Chinese. Upon completion of the instructional treatment, a post-test was administered to both the experimental and control groups to evaluate improvements in hanzi writing skills. Furthermore, students in the experimental group were asked to complete a response questionnaire to obtain data regarding their perceptions and attitudes toward the use of the Chinese Hanzi Handwriting application in learning hanzi writing.

The questionnaire data were analyzed using the prescribed formula and subsequently classified based on the percentage results of the student response questionnaire analysis. The classification criteria were determined according to the Likert scale presented in Table. The following presents the questionnaire data on students responses to the implementation of the Chinese Hanzi Handwriting application as a learning medium for developing hanzi writing skills.

Table 3. Results of the Student Response Questionnaire

No.	Statement	SA	A	D	SD
1	I like the Chinese Hanzi Handwriting application as a learning medium for Chinese hanzi writing	(23) 69,7%	(10) 30,3%	(0) 0%	(0) 0%
2	The Chinese Hanzi Handwriting application is easy to use and understand	(27) 81,8%	(6) 18,2%	(0) 0%	(0) 0%
3	The Chinese Hanzi Handwriting application helps improve hanzi writing skills by following the correct stroke order	(24) 72,7%	(9) 27,3%	(0) 0%	(0) 0%
4	The Chinese Hanzi Handwriting application enhances students interest and motivation in learning Chinese hanzi writing	(21) 63,6%	(12) 36,4%	(0) 0%	(0) 0%
5	The Chinese Hanzi Handwriting application has a positive impact on Chinese hanzi writing instruction	(18) 57,6%	(14) 42,4%	(0) 0%	(0) 0%
6	In my opinion, the Chinese Hanzi Handwriting application is relevant to the learning materials taught by the teacher	(20) 60,6%	(13) 39,3%	(0) 0%	(0) 0%
7	The Chinese Hanzi Handwriting application encourages greater enthusiasm for learning Chinese	(23) 69,7%	(10) 30,3%	(0) 0%	(0) 0%
8	I feel more confident and actively participate in Chinese language learning when assisted by the Chinese Hanzi Handwriting application	(22) 66,7%	(11) 33,3%	(2) 06,1%	(0) 0%
9	The Chinese Hanzi Handwriting application supports the process of learning Chinese hanzi writing	(19) 57,6%	(14) 42,4%	(0) 0%	(0) 0%
10	The Chinese Hanzi Handwriting application makes Chinese language learning more engaging and enjoyable	(20) 60,6%	(13) 39,4%	(0) 0%	(0) 0%

The results of each questionnaire item are described below according to the respective aspects measured in the student response questionnaire.

1) First Questionnaire Item

The first questionnaire item examined students preference for using the Chinese Hanzi Handwriting application as a learning medium for Chinese hanzi writing. The results indicated that 23 students (69,7%) strongly agreed, while 10 students (30,3%) agreed with the statement.

$$P = \frac{obtained\ score}{maximum\ score} \times\ 100\%$$
$$= \frac{(23 \times 4) + (10 \times 3) + (0 \times 2) + (0 \times 1)}{33 \times 4} \times 100$$
$$= \frac{92 + 30 + 0 + 0}{132} \times\ 100\% = \frac{122}{132} \times\ 100\ =\ 92{,}4\%$$

Based on the analysis of the first questionnaire item, a percentage score of 92,4% was obtained. According to Riduwan (2014) Likert scale interpretation criteria, this percentage falls within the "Very Good" category (81%–100%). These findings suggest that students showed a strong preference for the use of the Chinese Hanzi Handwriting application during Chinese language learning activities.

2) Second Questionnaire Item

The second questionnaire item assessed students perceptions regarding the ease of use of the Chinese Hanzi Handwriting application. The results revealed that 27 students (81,8%) strongly agreed and 6 students (18,2%) agreed that the application was easy to understand and operate.

$$P = \frac{obtained\ score}{maximum\ score} \times\ 100\%$$
$$= \frac{(27 \times 4) + (6 \times 3) + (0 \times 2) + (0 \times 1)}{33 \times 4} \times 100$$
$$= \frac{108 + 18 + 0 + 0}{132} \times\ 100\% = \frac{126}{132} \times\ 100\ =\ 95{,}5\%$$

The analysis yielded a percentage score of 95,5%, which is classified as "Very Good" according to the Likert scale criteria. This finding indicates that the application is user-friendly and can be easily understood by students during the learning process.

3) Third Questionnaire Item

The third questionnaire item examined whether the Chinese Hanzi Handwriting application could improve students hanzi writing skills, particularly in following the correct stroke order. The questionnaire results showed that 24 students (72,7%) strongly agreed and 9 students (27,3%) agreed with the statement.

$$P = \frac{obtained\ score}{maximum\ score} \times\ 100\%$$
$$= \frac{(24 \times 4) + (9 \times 3) + (0 \times 2) + (0 \times 1)}{33 \times 4} \times 100$$

$$= \frac{96 + 27 + 0 + 0}{132} \times 100\% = \frac{123}{132} \times 100 = 93{,}2\%$$

The percentage score obtained was 93,2%, which falls into the "Very Good" category. This finding demonstrates that the application has the potential to improve students hanzi writing skills by facilitating the correct stroke-order practice.

4) Fourth Questionnaire Item

The fourth questionnaire item investigated whether the Chinese Hanzi Handwriting application could enhance students interest and motivation in learning Chinese hanzi writing. The results showed that 21 students (63,6%) strongly agreed and 12 students (36,4%) agreed.

$$P = \frac{obtained\ score}{maximum\ score} \times 100\%$$
$$= \frac{(84 \times 4) + (12 \times 3) + (0 \times 2) + (0 \times 1)}{33 \times 4} \times 100$$

$$= \frac{84 + 36 + 0 + 0}{132} \times 100\% = \frac{120}{132} \times 100 = 90{,}9\%$$

The analysis produced a percentage score categorized as "Very Good" on the Likert scale. These findings suggest that the application positively contributes to increasing students enthusiasm, interest, and motivation in learning hanzi writing.

5) Fifth Questionnaire Item

The fifth questionnaire item evaluated students perceptions of the positive impact of the Chinese Hanzi Handwriting application on hanzi writing instruction. The findings indicated that 19 students (57,6%) strongly agreed and 14 students (42,4%) agreed.

$$P = \frac{obtained\ score}{maximum\ score} \times 100\%$$
$$= \frac{(19 \times 4) + (14 \times 3) + (0 \times 2) + (0 \times 1)}{33 \times 4} \times 100$$

$$= \frac{76 + 42 + 0 + 0}{132} \times 100\% = \frac{118}{132} \times 100 = 89{,}4\%$$

The percentage score obtained was 89,4%, which falls within the "Very Good" category. This result indicates that the application not only facilitates the learning of hanzi writing but also promotes greater student engagement, making the learning process more effective and enjoyable.

6) Sixth Questionnaire Item

The sixth questionnaire item assessed whether the Chinese Hanzi Handwriting application was aligned with the instructional materials taught by the teacher. The results showed that 20 students (60,6%) strongly agreed and 13 students (39,4%) agreed.

$$P = \frac{obtained\ score}{maximum\ score} \times 100\%$$
$$= \frac{(20 \times 4) + (13 \times 3) + (0 \times 2) + (0 \times 1)}{33 \times 4} \times 100$$

$$= \frac{80 + 39 + 0 + 0}{132} \times 100\% = \frac{119}{132} \times 100 = 90{,}2\%$$

A percentage score of 90,2% was obtained, which is categorized as "Very Good". Therefore, it can be concluded that the application is relevant and compatible with the instructional content delivered in the classroom.

7) Seventh Questionnaire Item

The seventh questionnaire item examined whether the Chinese Hanzi Handwriting application could increase students enthusiasm for participating in Chinese language learning activities. The results indicated that 23 students (69,7%) strongly agreed and 10 students (30,3%) agreed.

$$P = \frac{obtained\ score}{maximum\ score} \times 100\%$$
$$= \frac{(23 \times 4) + (10 \times 3) + (0 \times 2) + (0 \times 1)}{33 \times 4} \times 100$$
$$= \frac{90 + 30 + 0 + 0}{132} \times 100\% = \frac{122}{132} \times 100 = 92{,}4\%$$

The analysis yielded a percentage score of 92,4%, placing it in the "Very Good" category. These findings demonstrate that the application successfully fosters students enthusiasm and active participation in Chinese language learning.

8) Eighth Questionnaire Item

The eighth questionnaire item investigated whether students felt more confident and active during Chinese language learning when assisted by the Chinese Hanzi Handwriting application. The results showed that 22 students (66,7%) strongly agreed, 11 students (33,3%) agreed, and 2 students (6,1%) disagreed.

$$P = \frac{obtained\ score}{maximum\ score} \times 100\%$$
$$= \frac{(22 \times 4) + (11 \times 3) + (2 \times 2) + (0 \times 1)}{33 \times 4} \times 100$$
$$= \frac{88 + 30 + 4 + 0}{132} \times 100\% = \frac{125}{132} \times 100 = 94{,}7\%$$

The percentage score obtained was 94,7%, which is classified as "Very Good". These findings indicate that the application contributes positively to students confidence and active engagement during classroom learning activities.

9) Ninth Questionnaire Item

The ninth questionnaire item examined whether the Chinese Hanzi Handwriting application supported the process of learning Chinese hanzi writing. The results revealed that 19 students (57,6%) strongly agreed and 14 students (42,4%) agreed.

$$P = \frac{obtained\ score}{maximum\ score} \times 100\%$$

$$= \frac{(19 \times 4) + (14 \times 3) + (0 \times 2) + (0 \times 1)}{33 \times 4} \times 100$$

$$= \frac{76 + 42 + 0 + 0}{132} \times\ 100\% = \frac{118}{132} \times\ 100\ =\ 89{,}4\%$$

The percentage score reached 89,4%, which falls within the "Very Good" category. This result confirms that the application effectively supports students in learning hanzi writing in the classroom.

10) Tenth Questionnaire Item

The final questionnaire item assessed whether the Chinese Hanzi Handwriting application could make Chinese language learning more engaging and enjoyable. The findings indicated that 20 students (60,6%) strongly agreed and 13 students (39,4%) agreed with the statement.

$$P = \frac{obtained\ score}{maximum\ score} \times\ 100\%$$

$$= \frac{(20 \times 4) + (13 \times 3) + (0 \times 2) + (0 \times 1)}{33 \times 4} \times 100$$

$$= \frac{80\ + 39\ + 0 + 0}{132} \times\ 100\% = \frac{119}{132} \times\ 100\ =\ 90{,}2\%$$

The analysis produced a percentage score of 90,2%, which is categorized as "Very Good". This finding suggests that the application enhances the attractiveness of Chinese language learning and contributes to a more engaging learning environment for hanzi writing instruction.

Students responses to the use of the Chinese Hanzi Handwriting application in hanzi writing instruction were measured using a questionnaire administered to the experimental group after the post-test. The questionnaire data analysis revealed that all items fell within the 81%–100% range, categorized as "Very Good". This was evidenced by the percentage scores obtained for each statement: the first statement (92,4%), the second statement (95,5%), the third statement (93,2%), the fourth statement (90,9%), the fifth statement (89,4%), the sixth statement (90,2%), the seventh statement (92,4%), the eighth statement (94,7%), the ninth statement (89,4%), and the tenth statement (90,2%).

DISCUSSION

The findings of the student response questionnaire demonstrated similarities to those reported by Herlina (2023) in the study entitled "Pengembangan Media 彩虹字笔顺 Cǎihóng Zì Bǐshùn untuk Pembelajaran Menulis Hanzi Kelas XI ULP SMK Negeri 6 Surabaya" Both studies obtained percentage scores ranging from 81% to 100% across all questionnaire items, indicating a "Very Good" level of student response. These results suggest that the integration of digital learning media into Chinese language instruction contributes positively to the learning process and supports the achievement of effective learning outcomes. In the present study, the Chinese Hanzi Handwriting application was found to facilitate students hanzi writing practice by helping them understand character structures and stroke sequences more

effectively, thereby increasing their interest and engagement in learning hanzi writing. Moreover, the use of this application enabled teachers to deliver instructional materials in a more interactive and engaging manner, creating a positive learning environment that supported the development of students hanzi writing skills and enhanced the overall effectiveness of the learning process.

Based on the analysis of all questionnaire items, it can be inferred that students demonstrated highly positive responses toward the implementation of the Chinese Hanzi Handwriting application in hanzi writing instruction. The consistently high percentage scores across all items indicate that the application was perceived as useful, engaging, and supportive of the learning process. These findings were derived from questionnaire data, which, according to Sugiyono (2017), serve as a means of collecting respondents perceptions, opinions, and experiences regarding a particular phenomenon. The results suggest that the integration of the Chinese Hanzi Handwriting application not only enhanced students motivation and participation during classroom activities but also facilitated the acquisition of knowledge, practical experience, and hanzi writing skills. Furthermore, students reported positive learning experiences and perceived improvements in their learning outcomes following the implementation of the application. Therefore, the Chinese Hanzi Handwriting application can be regarded as an effective instructional medium for supporting the development of hanzi writing skills among secondary school learners.

The use of the Chinese Hanzi Handwriting application in hanzi writing instruction was found to help students count the stroke order of hanzi characters, thereby fostering greater interest in developing hanzi writing skills. Through the use of appropriate learning media, teachers were able to deliver Chinese hanzi writing instruction in an enjoyable learning atmosphere, thus creating optimal learning conditions.

CONCLUSIONS AND RECOMMENDATIONS

The implementation of hanzi writing instruction in the experimental class XI BD II using the Chinese Hanzi Handwriting application proceeded well and was consistent with the learning module. The effectiveness of the application was demonstrated by a significant improvement in students' learning outcomes. This was further supported by the results of the student response questionnaire, which indicated that the Chinese Hanzi Handwriting application could serve as an effective medium for Chinese language instruction, particularly in hanzi writing. The percentage scores for each statement fell within the 81%–100% range, categorized as “Very Good”. Based on these findings, the questionnaire results regarding students mastery of all aspects of hanzi writing-including identifying the number and types of hanzi characters through the use of the Chinese Hanzi Handwriting application were well received by all students in class XI BD II.

Effective learning requires the active engagement of all parties involved in order to create meaningful interaction throughout the learning process. The findings of this study demonstrate that the use of the Chinese Hanzi Handwriting application as a supporting medium for hanzi writing instruction

effectively enhanced students engagement, confidence, and learning outcomes, both inside and outside the classroom. Furthermore, the application offers teachers an opportunity to develop more varied instructional strategies and models by integrating technology with other teaching methods, thereby making the learning process more engaging and innovative.

FURTHER STUDY

Future research is recommended to further develop the use of the Chinese Hanzi Handwriting application in other aspects of Mandarin language learning, such as vocabulary mastery, sentence construction, and simple essay writing, so that the application can serve a broader function in supporting Mandarin language instruction. Further studies involving larger sample sizes and a wider range of educational settings are also needed to evaluate the application's effectiveness across different language skills and learner levels.

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