



The Impact of Digital Literacy on 三级的生词 (Third-Level Vocabulary) in Mandarin Language Learners

Aiga Ventivani^{1(*)}, Karina Fefi Laksana Sakti², Dhevy Olivia Firdaus³, Galuh Bunga Usadani⁴, Miftachul Amri⁵

^{1,2,3,4}State University of Malang, Malang, Indonesia

⁵State University of Surabaya, Surabaya, Indonesia

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Abstract

In the context of language learning, including Mandarin education in Indonesia, digital literacy provides substantial benefits such as broader access to diverse learning resources, interactive learning opportunities, and more personalized learning experiences, while vocabulary mastery remains a fundamental component of language acquisition because it underpins learners' ability to comprehend and use the target language effectively. However, although digital literacy has been widely examined in general educational settings, empirical evidence that specifically links digital literacy to HSK Level 3 (三级) vocabulary mastery (三级的生词) among first-year Mandarin students remains limited; therefore, this study addresses this gap by investigating (1) students' digital literacy levels, (2) their mastery of HSK 3 vocabulary, and (3) the relationship between the two variables among Mandarin Language Study Program students. Using a quantitative survey design, primary numerical data were collected from 205 respondents and analyzed statistically. The results indicate that digital literacy significantly predicts HSK 3 vocabulary mastery ($p < 0.05$) and demonstrates substantial explanatory power: based on the proportion of regression sum of squares to total sum of squares ($13,093.326 / 15,307.395$), the model accounts for approximately 85.5% of the variance in vocabulary mastery, with strong overall model fit ($F = 1200.480$). These findings suggest that higher digital literacy is associated with better HSK 3 vocabulary mastery, highlighting digital literacy as a key factor in supporting successful Mandarin learning in digitally mediated environments and providing evidence to inform more targeted digital-literacy strengthening to optimize students' use of learning applications, educational videos, and digital dictionaries.

Keywords:

Digital Literacy; vocabulary acquisition, HSK-3 Vocabulary, Mandarin Chinese

(*) Corresponding Author: aiga.ventivani.fs@um.ac.id

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INTRODUCTION

In today's rapidly evolving digital era, technology has become integral to educational practice and has transformed how learners access, evaluate, and engage with instructional materials (Audrin et al, 2022; Fadli, 2021; Hadayani, 2020; Ramadhani, 2022; Salsabila, 2021). In this setting, digital literacy—defined as the ability to use, understand, and produce information through digital technologies—



constitutes both an enabling competence and a potential constraint, particularly when learners lack sufficient skills to navigate digital information effectively. In the domain of language learning, especially Mandarin language education in Indonesia, digital literacy may enhance learning by expanding access to varied resources, enabling interactive learning modalities, and supporting more individualized learning pathways that facilitate independent practice and vocabulary development. Given that the Internet provides immediate access to extensive information, educational institutions are required not only to integrate digital resources but also to ensure that learners are prepared to use them critically and responsibly (Suwanto, 2020). Consistent with this rationale, Svensson et al. (2021) report that assistive technology can improve reading ability and is particularly beneficial for learners who experience substantial learning challenges. This perspective is highly relevant to foundational first-year Mandarin courses, where students are expected to develop an integrated base across the four language skills (listening, speaking, reading, and writing) alongside vocabulary acquisition and grammatical competence, and where appropriately mediated digital support may reduce early-stage learning barriers and strengthen learning outcomes (Svensson et al., 2021).

Mandarin Chinese, with its complex character system and linguistic structure, often presents significant challenges for first-year university students. Vocabulary serves as the primary and most crucial component in language acquisition (Nurhalimah et al., 2020). Lexical mastery constitutes one of the most critical aspects of language learning, as sufficient vocabulary forms the foundation for adequate language comprehension and usage. Vocabulary acquisition represents a fundamental element in language study. Without adequate mastery of vocabulary, students' communicative abilities remain severely limited. Winarti (2023) contends that vocabulary proficiency not only enhances language skills but also determines an individual's language quality. However, many first-year students encounter difficulties in expanding their Mandarin vocabulary, primarily due to limited classroom learning time and challenges in accessing appropriate learning resources.

First Intake Student Data

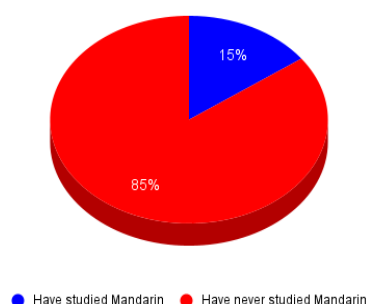


Figure 1. First Batch Student Data

As illustrated in Figure 1, the majority of first-year students are novice learners of Mandarin Chinese. Most of these students began studying Mandarin only upon entering university. Based on a needs analysis conducted among

Mandarin Education students at the State University of Malang and the State University of Surabaya, several challenges faced by first-year students in learning Mandarin were identified. These findings reveal that first-year students frequently encounter obstacles in vocabulary enrichment, including limited study time and insufficient engaging learning resources, among other difficulties. In this context, digital literacy presents a potentially effective solution.

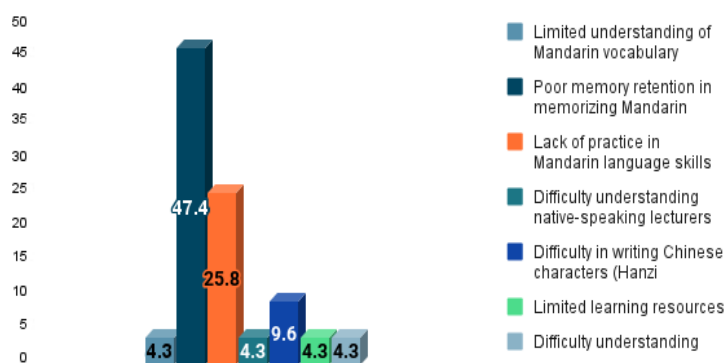


Figure 2. Graph of Difficulties Encountered by Students When Learning Mandarin Language Skills

The utilization of digital literacy can serve as an effective solution to address these challenges. Currently, Mandarin language students demonstrate considerable familiarity with technology applications in both daily life and educational contexts. Various digital platforms, including language learning applications, educational videos, digital dictionaries, and interactive media, offer students opportunities for autonomous and contextualized learning. Furthermore, digital technology facilitates access to authentic learning resources such as articles, podcasts, and videos in Mandarin, enabling students to comprehend vocabulary usage in real-world contexts.

Digital technology can enhance learning motivation through more engaging and interactive teaching methods, strategies, and media. This finding aligns with research conducted by Haeroni et al. (2023), which revealed that digital literacy has a significant impact on students' reading interests. Consistent with Haeroni et al.'s (2023) findings, Khumaeroh and Mayuni's (2023) study similarly demonstrated that digital literacy increases student engagement and facilitates reading skill development. Digital literacy enables students to utilize various applications and platforms, including digital dictionaries, language learning applications, and technology-based educational videos. This research aims to examine the impact of digital literacy on Mandarin lexical competence among undergraduate students. The heterogeneous digital literacy levels observed among first-year cohorts potentially influence their learning outcomes. The study holds significant importance as it elucidates the role of digital literacy as a critical success factor in Mandarin language acquisition. The anticipated outcomes are projected to inform the design of optimized technology-enhanced pedagogical approaches, thereby facilitating the advancement of Mandarin language education quality in the contemporary digital landscape.

This study aims to investigate the impact of digital literacy on Mandarin vocabulary acquisition among first-year students. This study is important to provide

deeper insight into the role of digital literacy in supporting the foreign language learning process. The results of this study are expected to contribute to the development of more effective technology-based learning strategies, as well as serve as a basis for educational institutions to enhance students' digital literacy and support their learning. The learning process in the Mandarin Language Education Study Program is currently integrated and utilizes technology. The use of technology is not limited to online learning; it also extends to other areas. Face-to-face learning is also dominated by the use of technology in it. Hasliyah (2022) stated that learning via the Internet increases students' access to information sources. This is because, through the Internet, students can access various information in a relatively short time from diverse and unlimited sources.

The results of a survey by the Indonesian Ministry of Communication and Information, as posted on its official website, indicate a 2022 national digital literacy index of 3.54 on a scale of 1-5. The digital literacy index based on education segmentation is at an index of 3.70. This indicates that the Indonesian government also pays close attention to the level of digital literacy among the Indonesian people from various aspects. Fitriyani and Mukhlis (2021) argue that today's students must be able to analyze information from the Internet. The integration of technology into the higher education learning process indicates that students are viewed as having the independence to process information from the Internet. Therefore, it is essential to determine the level of digital literacy among students. However, research on the level of digital literacy has been widely conducted (Nasionalita, 2020; Naufal, 2021; Tazun, 2022; Takariani, 2023, etc.). However, research on the specific digital literacy level of Mandarin language students is rarely conducted. Given the importance of the current level of digital literacy and the availability of measurement instruments, the team aimed to assess the level of digital literacy among Mandarin language students using the "数字素养" instrument, which was deemed suitable for this study.

Although many studies have discussed digital literacy in general learning contexts, empirical evidence that explicitly examines its effect on Mandarin vocabulary mastery—particularly HSK Level 3 vocabulary (三级的生词) among first-year students who are still building foundational competence—remains limited and is not consistently emphasized in prior research. Therefore, the purpose of this study was to examine the effect of digital literacy on Mandarin vocabulary mastery in Mandarin Language Study Program students. This study aims to analyze the level of digital literacy among students, assess their ability to master vocabulary, and understand the relationship between the two variables, with a specific focus on mastery of 三级的生词 (HSK level 3 vocabulary) as a foundational target for early-stage learners. In addition, this study is expected to provide recommendations for effective digital technology-based learning strategies to improve Mandarin vocabulary mastery, thereby supporting a more optimal and relevant learning process that meets the needs of the digital era. This study formulated two hypotheses that became the basis for statistical analysis. The null hypothesis (H_0) states that there is no significant effect between digital literacy on the mastery of 三级的生词 (HSK level 3 vocabulary) in Mandarin language students. On the other

hand, the alternative hypothesis (H_a) states that there is a significant effect between digital literacy on the mastery of 三级的生词 (HSK level 3 vocabulary) in Mandarin language students. This hypothesis formulation is used to quantitatively test the relationship between the two variables through simple linear regression analysis so that it can be seen to what extent digital literacy plays a role in supporting the achievement of foreign language learning in the digital era.

METHODS

This type of research is quantitative, utilizing a survey method. This study aims to determine the effect of digital literacy on the mastery of 三级的生词 [Sān Jí de Shēngcí].in Mandarin language students. This study focuses on the results of primary data measurements, which are presented in numerical form and analyzed using statistical methods. This research method begins by determining the population and research sample, followed by preparing the research instrument. Taking data in the field, conducting data analysis, and concluding. The team agreed that Mandarin Language Education students at Malang State University and Surabaya State University were the population in this study. The research team used the Slovin formula to determine the number of samples taken, which was 205 samples. In this study, researchers selected first- and second-year students from each university as the sample, including those from both first- and second-batch cohorts. The instruments used included a questionnaire to measure the level of students' digital literacy and a test to evaluate the mastery of 三级的生词 [Sān Jí de Shēngcí]. Next, a normality test was conducted to ensure that the data were normally distributed, followed by a linearity test to test the linear relationship between the digital literacy variables and sheng mastery. After meeting these assumptions, a hypothesis test was conducted using simple linear regression using SPSS version 25 for Windows to determine the extent to which digital literacy affects the mastery of 三级的生词 [Sān Jí de Shēngcí].

RESULTS & DISCUSSION

Result

The data sources for this study included Mandarin language students from Malang State University and Surabaya State University. The data from this study consisted of the results from two questionnaire instruments, presented as scores. Each questionnaire contained 50 questions about digital literacy and HSK 3 vocabulary mastery. Data collection was carried out by distributing questionnaires to Mandarin language students. Data collection was conducted on multiple occasions at various times. This was because it was adjusted to the free time of each batch and offering. Data collection was conducted from May 16, 2025, to June 2, 2025, at GKB A20, 7th floor, 6th floor, Building D15, 2nd floor, and Building T8, Surabaya State University.

The population in this study consisted of 421 Mandarin language students from the 2023 and 2024 batches of Malang State University and Surabaya State University. The research team used the Slovin formula to determine the number of samples taken, which was 205 random samples. The sampling technique used was random sampling. The data obtained were then analyzed quantitatively using the Shapiro-Wilk normality test, conducted with SPSS version 25 for Windows, at a significance level of 0.05. The linearity test was conducted using the ANOVA technique with the help of SPSS version 25 for

Windows. The following are the results of the data obtained.

a. Descriptive Statistical Test

Data from the descriptive statistical analysis regarding the effect of digital literacy on HSK 3-level vocabulary mastery in Mandarin Language Education students can be seen in Table 1.

Table 1. Descriptive Statistics Test Results

	N	Minimum	Maximum	Mean	Std. Deviation
Digital Literacy	205	50.00	90.00	69.7171	8.93648
Mastery of 生词	205	48.00	92.00	70.6341	8.69572
Valid N (listwise)	205				

Based on the results of the descriptive statistical analysis, it is evident that the study included 205 respondents. The digital literacy variable ranges from a minimum value of 50 to a maximum value of 90. The average (mean) digital literacy value is 69.72, with a standard deviation of 8.94. This indicates that the level of digital literacy among respondents falls into the medium to high category, with a relatively even distribution of data. Meanwhile, the variable of 生词 mastery results has a minimum value of 48 and a maximum of 92. The average value of 生词 mastery results is 70.63 with a standard deviation of 8.70. These data indicate that the achievement of respondents' mastery of 生词 results is relatively high, with a distribution of values that is not significantly different from the average value. The number of valid data for both variables is 205 respondents.

Based on the study's results, it was found that digital literacy has a significant influence on HSK vocabulary mastery among Mandarin Language Education students. The results of the descriptive statistical analysis showed that the average digital literacy score was 69.72, while the average vocabulary mastery (生词) reached 70.63. Both variables have relatively low standard deviations, indicating an even distribution of data. This finding aligns with research by Churchill (2020), which highlights the importance of digital literacy in supporting language learning through diverse digital resources.

b. Analysis Prerequisite Test

Prerequisite tests conducted before the main analysis in this study included the normality test. The normality test was performed to determine whether the data from variables X and Y were normally distributed. The normality test employed the Shapiro-Wilk method using SPSS version 25 for Windows software.

Table 2. Normality Test Results

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Digital Literacy	.059	205	.080	.988	205	.093
Mastery of 生词	.059	205	.079	.992	205	.293

Based on the Normality Test Table, it is evident that the normality test was conducted using two approaches, the Kolmogorov-Smirnov test, and the Shapiro-Wilk test, to determine whether the data from the digital literacy variables and the results of 生词 mastery were normally distributed. Based on the two normality test methods, namely the Kolmogorov-Smirnov and Shapiro-Wilk tests, both variables in this study meet the normality assumption. This allows for further analysis using parametric statistical methods. For the digital literacy variable, the Kolmogorov-Smirnov test yielded a p-value of 0.080, and the Shapiro-Wilk test yielded a p-value of 0.093. Both significance values are greater than the significance level of 0.05 ($0.080 > 0.05$ and $0.093 > 0.05$), so it can be concluded that the digital literacy variable data are normally distributed according to both methods.

Meanwhile, for the 生词 mastery variable, the Kolmogorov-Smirnov test results showed a significance value of 0.079, and the Shapiro-Wilk test results showed a significance value of 0.293. The significance values in both methods are also greater than 0.05 ($0.079 > 0.05$ and $0.293 > 0.05$), so it can be concluded that the HSK learning outcome data is also normally distributed.

Table 3. Linearity Test Results

		Sum of Squares	df	Mean Square	F	Sig.
Digital Literacy	(Combined)	13322.582	20	666.129	58.283	.000
Mastery of 生词	Linearity	13028.155	1	13028.155	1139.897	.000
	Deviation from Linearity	294.427	19	15.496	1.356	.154
	Within Groups	2102.979	184	11.429		
	Total	15425.561	204			

Based on the Linearity Test Table, it is obtained that the significance value of the linearity test results between the digital literacy variable (X) and 生词 mastery (Y) is 0.000 in the Linearity row, while the significance value in the Deviation from Linearity row is 0.154. The significance value in the Linearity test is less than $\alpha = 0.05$ ($0.000 < 0.05$), and the significance value in Deviation from Linearity is greater than 0.05 ($0.154 > 0.05$). Therefore, it can be concluded that there is a significant linear relationship between the digital literacy variable and 生词 mastery. This means that changes in digital literacy are significantly related to changes in 生词 mastery, and the relationship is linear. Thus, the results of the linearity analysis indicate that the data meet the linearity assumption, allowing for further testing of the relationship or influence using advanced parametric analyses, such as regression or correlation.

Table 4. Simple Linear Regression Test Results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13028.155	1	13028.155	1103.157	.000 ^b
	Residual	2397.406	203	11.810		
	Total	15425.561	204			

Based on the ANOVA table of the simple linear regression test results, it was found that the significance value was 0.000, which is smaller than the significance level used, namely $\alpha = 0.05$ ($0.000 < 0.05$). This indicates that the alternative hypothesis (H_a) is accepted and the null hypothesis (H_0) is rejected. Thus, it can be concluded that there is a significant influence between the digital literacy variable and the mastery of 生词. This means that changes in the level of digital literacy contribute significantly to changes in the value of 生词 mastery in respondents. These results also indicate that the regression model used is feasible to predict HSK learning outcomes based on digital literacy values.

Furthermore, the results of the coefficient of determination (R^2) can be analyzed to determine the quantitative influence it has on the outcome. The results of the normality and linearity tests support the use of parametric analysis. The Shapiro-Wilk test shows that the data for both variables are normally distributed with a significance value greater than 0.05. In addition, the linearity test produced a significance value of 0.000, indicating a strong linear relationship between digital literacy and vocabulary mastery. As stated by Pangrazio et al. (2020), digital literacy is a fundamental skill for accessing, evaluating, and managing relevant information in language learning.

Table 5. Coefficient Determination Results (Adjusted R)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.919 ^a	.845	.844	3.43655

Based on Table 5. Model Summary: The correlation coefficient (R) value of 0.919 indicates a strong relationship between the digital literacy variable and HSK learning outcomes. Meanwhile, the determination coefficient (R Square) value of 0.845 indicates that the digital literacy variable can explain 84.5% of the variation in HSK learning outcomes. Other variables outside the model explain the remaining 15.5%. In addition, the Adjusted R-squared value of 0.844 indicates that the regression model remains stable and accurate, even after adjusting for the number of predictors and samples. The Standard Error of the Estimate value of 3.43655 indicates the average prediction error in the regression model used. Thus, this regression model is highly effective in explaining the impact of digital literacy on HSK learning outcomes. The high R² value strengthens previous findings that the relationship between the two variables is significant and linear.

The very high R² value (0.845) indicates that the model explains a substantial proportion of the variance in HSK learning outcomes, which supports the conclusion that digital literacy plays an important role in students' performance. At the same time, this strong result should be interpreted carefully because both digital literacy and HSK-related performance were measured using similar self-report instruments within a single survey session, which may slightly inflate the observed strength of the relationship without invalidating it. Nevertheless, the consistency between the high R, R², and Adjusted R² values, together with the statistically significant p-value, suggests that the relationship captured by the model is not only statistically meaningful but also practically relevant for the context of Mandarin language learning, although part of the effect size may also reflect students' general response tendencies.

Table 6. Coefficients Results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	8.290	1.892		4.381	.000
	literacy	.894	.027	.919	33.214	.000

The results of the simple linear regression presented in Table 6 indicate that digital literacy has a statistically significant effect on vocabulary mastery, with a p-value of 0.000 that is lower than the predetermined significance level of $\alpha = 0.05$. This significance is supported by a high coefficient of determination (R²) of 0.845, showing that 84.5% of the variance in HSK vocabulary mastery is explained by digital literacy, so that digital literacy emerges as a dominant factor in students' vocabulary learning outcomes. These findings are consistent with Simbolon's (2022) study, which also reports a positive influence of digital literacy on reading ability and text comprehension, although the effect size in the present study appears stronger, which may be related to differences in learning context, sample characteristics, or measurement instruments that specifically target vocabulary mastery. At the same time, other studies have found more moderate relationships between digital literacy and learning outcomes, suggesting that the strength of this effect should be understood as context-dependent rather than as a universal benchmark across all settings. The regression coefficient further shows that a one-unit increase in digital literacy score is associated with a 0.894-unit increase in vocabulary mastery score, reinforcing the view that

strengthening digital literacy can yield meaningful practical gains, both in terms of language proficiency and in expanding students' access to relevant learning resources, and thus deserves to be positioned as a strategic focus in the development of Mandarin language instruction in higher education.

Discussion

The use of technology in learning not only increases efficiency but also encourages the creation of more engaging and interactive learning experiences. According to Azhari and Fajri (2021), technology enables hybrid-based learning that integrates online and offline methods, thereby expanding educational accessibility. Along with the development of technology, the learning process, both inside and outside the classroom, continues to progress. Ramli (2012) stated that learning technology aims to design, implement, and evaluate the learning process to ensure optimal operation. Technological innovation in education aims to maximize student learning outcomes (Ahmadi, 2020). Learning technology is closely related to educational technology, which involves interactions between humans, procedures, and tools in solving a problem (Ahmadi, 2020). Currently, the use of technology in learning has become commonplace. Therefore, the success of the learning process in the 5.0 era is highly dependent on the abilities of the human resources involved. Digital literacy refers to an individual's ability to access, comprehend, and interpret information from various digital sources (Hasliyah, 2022). In line with Hanelahi and Atmaja (2020), digital literacy is defined as the ability to understand and use digital devices to find, evaluate, and obtain information safely, effectively, efficiently, and wisely, thereby facilitating communication and interaction in everyday life. Restianty (2018) stated that an understanding of digital literacy is necessary to interact effectively, as society is increasingly developing with unlimited access to technology. This understanding can foster an understanding of the use of information technology.

In Mandarin, the four main language skills are known as 听 (listening), 说 (speaking), 读 (reading), and 写 (writing). Mastery of these four skills allows speakers to communicate and exchange information effectively, both orally and in writing. To master these skills, a solid foundation in vocabulary and grammar is essential. In other words, a Mandarin learner cannot communicate fluently without a good understanding of vocabulary and grammar. For beginners, mastering vocabulary in Mandarin can be a significant challenge because it is a foreign language they may be encountering for the first time. According to Fauziah (2015), the most important aspect of learning Mandarin is to develop skills that enhance workability. In the context of learning Mandarin, vocabulary mastery is essential because Hanzi characters, the main elements of Mandarin, contain complex meanings and require a deep understanding. Each Hanzi character has a unique structure and tone that affect its meaning and often involves semantic relationships with other characters. Mastery of Mandarin vocabulary helps learners not only understand the language but also the culture and way of thinking of Chinese people. Therefore, teaching vocabulary systematically and in context is an important strategy for learning Mandarin.

Research on digital literacy in education reveals several significant findings.

The study "The Use Of Digital Media To Improve Students' Literacy In English Learning In Junior High School" concluded that digital media can increase student engagement and motivation despite being constrained by internet access and technological competence (teachers and students). The study "Digital Literacy in Strengthening Islamic Studies of Ftik IAIN Tulungagung Students" found that the lecturer's strategy for building E-Journal competence is quite structured; however, it is still necessary to improve students' ability to evaluate content. Meanwhile, the study "The Influence of Digital Literacy Level on the Ethics of Using Instagram Social Media Among Students of Sma Negeri 2 Pekanbaru" showed that digital literacy has a positive effect of 47% on the ethics of using Instagram, with an average digital literacy score of 3.9 and ethics of use of 3.99. Furthermore, the influence of digital literacy has also been proven to be significant in reading interest and language skills. The study "Digital Literacy and Its Impact on Reading Interest in Prospective Elementary School Teachers" demonstrates a positive influence of digital literacy on reading interest among 6th-semester students, with a significance value of 0.000. The study "Upgrading Students' Reading Skills Through Digital Literacy Practices" demonstrates that social media platforms, such as Facebook and WhatsApp, can enhance students' reading, writing, and vocabulary skills. However, challenges like a lack of facilities persist. The study "The Effectiveness of Digital Literacy Indicators in Improving Students' Reading Interest" reported an effectiveness of 29% in increasing reading interest among grade V students and recommends further research to explore other factors, such as the role of family and academic values.

CONCLUSION

The results of the study showed a significant influence of digital literacy on the mastery of 三级的生词 in Mandarin language students, as indicated by a simple linear regression test with a significance value of 0.000 ($p < 0.05$). This indicates that higher digital literacy is associated with better 三级 vocabulary mastery; therefore, lecturers and institutions should integrate digital tools (learning apps, educational videos, digital dictionaries) and provide brief, structured digital literacy training (e.g., 2–3 sessions early in the semester) to improve students' ability to find, evaluate, and use learning resources independently. However, this study is limited by the use of a single-predictor model and the potential influence of other unmeasured factors e.g., prior proficiency, motivation, study time, and the findings may be less generalizable if the sample is limited to one cohort/institution or if digital literacy is measured via self-report. Future research should test broader models and use quasi-experimental or experimental designs with pre–post tests and delayed retention measures, while also incorporating objective indicators and more diverse samples across institutions or proficiency levels.

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