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An Exploratory Study on the Effectiveness of the SmartJawi Application in Enhancing Reading, Writing, and Motivation among 5-Year-Old Children

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Abstract

Early literacy is essential in establishing a child's educational foundation, especially for Jawi literacy, which is a fundamental aspect of Islamic education in Malaysia. The use of digital tools like the SmartJawi program presents intriguing opportunities for improving children's engagement and foundational abilities in Jawi. This exploratory study assessed the initial efficacy of the SmartJawi application in five-year-old children. A quantitative experimental design was utilised, comprising one early childhood educator and five children from a private kindergarten in Jelawat, Bachok, Kelantan. The study was conducted over a three-week period, consisting of a pre-test, a one-week intervention using the SmartJawi application (implemented over four days at one hour per day), and a post-test. Evaluations concentrated on three areas: learning motivation, reading, and writing in Jawi. The results indicated a substantial enhancement in learning motivation and writing skills subsequent to the intervention. Despite an enhancement in reading scores, the alteration was not statistically significant. The initial findings indicate that the SmartJawi application may serve as a useful instrument for improving early Jawi literacy, especially in cultivating motivation and writing proficiency. It is advisable to conduct more study with a larger sample size and prolonged length to corroborate and enhance these preliminary findings.

Keywords: Early Childhood Education, Learning Tool, Preschool Children, Technological Education

Introduction

Jawi education (Ahmad & Salleh, 2022; Mohd Noor & Abdul Rahman, 2019; Zainal & Karim, 2023) constitutes a significant component of the early childhood education framework (Hassan & Yusoff, 2021; Alias & Ismail, 2020) that is deeply embedded in the traditions and culture of the Malay-Muslim population in Malaysia. The Jawi script, derived from Arabic letters, has historically served as a means of communication across diverse domains (Omar, 1992; Salleh, 2010), particularly in the composition of religious writings, literature, and administrative matters in earlier times. The use of Jawi script from the preschool level in contemporary education establishes a foundation that enhances literacy abilities while safeguarding national history (Ghazali et al., 2025a; Tamyis et al., 2021).

Children are in a pivotal phase of cognitive and linguistic development (Berk, 2013; Vygotsky, 1978), during which early exposure to Jawi script can enhance fine motor abilities, visual memory, and phonological awareness. Child-centric and developmentally suitable strategies, including interactive techniques, linguistic games, and digital apps (Adzhari & Din, 2021; Kouser & Majid, 2021), can enhance the engagement and efficacy of the Jawi learning process. Furthermore, Jawi education facilitates a fundamental comprehension of Quranic and Islamic writings (Al-Waahab et al., 2021; Kamaruzaman & Nik Abdullah, 2021), hence enhancing the moral and spiritual education of children.

Within the context of early childhood education in Malaysia, Jawi acquisition is often hindered through cognitive and affective issues that do not support the best acquisition. Not only must children learn to appreciate the divergent letter forms which distinguish between Jawi and the Rumi script but also manage the motivation impediments created by the feeling that Jawi has less to offer in modern life. As Mohd Razali and Hamzah (2024) emphasize, the Jawi script has been marginalized as per this current trend in the society especially among the school-going children. Certain analysis of this statement has been showing that the marginalization of Jawi is not a purely linguistic problem, but it is partly the dominance of the digital culture, in which the use of Rumi and English takes precedence. On this note the inclination of the community to these scripts can be witnessed both in the informal and official setting. Such barriers as insufficient interactive teaching resources (Ghazali et al., 2025c; 2025d) and a relatively low level of Jawi literacy among the educators (Majit & Taat, 2025; Mohamad Yusof and Zulkifli, 2021; Nahar et al., 2018), which reduce the pedagogical efficiency in a combination, are also present. This, in turn, secures that the teaching of Jawi would require a more-connective solution, i.e., project-based learning or technology integration, to allow children to see the differences in its usefulness in the context of religion, culture, and national identity.

Therefore, efforts to strengthen Jawi education among children should be seen as a necessity, not just an option. This includes the provision of a progressive curriculum (please refer to Figure 1), the training of skilled teachers, and support from parents and the community. In the modern era filled with the influence of technology and foreign languages, Jawi education that is introduced creatively and effectively can become a cultural stronghold and the basis for the formation of the identity of the younger generation of Muslims.

Table 1
The Component of Jawi Education in Malaysian Preschool Standard Curriculum for Children 4-5 Years Old

Focus	Content Standard	Learning Standard
P1 6.0 Jawi	PI 6.1: Recognizes Jawi letters	P1 6.1.1: Pronounces the Jawi letters
	PI 6.2: Reads words containing two open syllables	PI 6.2.1: Segments Jawi letters that are combined with the vowel letter alif
	PI 6.3: Writes Jawi letters	PI 6.3.1: Coordinates eye-hand movement through sketching shapes, patterns, and lines from right to left

Source: Ministry of Education Malaysia (2017)

Literature Review

The Use of Technological Tools in Language Education

In the contemporary digital age, the integration of technology in language instruction and acquisition is progressively more prevalent within the modern educational framework (Su et al., 2023; Van der Westhuizen & Hannaway, 2021). Learning tools, interactive software, educational videos, and digital platforms have revolutionised conventional methodologies, rendering them more dynamic, enjoyable, and readily accessible to students of all ages (Alessa & Hussein, 2023; Kandukoori et al., 2024). Technology has emerged as a tool that captivates and sustains children's interest in learning, simultaneously enhancing early literacy skills within a more engaging and interactive setting.

Technology significantly enhances the language learning experience by offering diverse visual and aural resources that facilitate students' comprehension of language concepts (Adzhari et al., 2021). Technology facilitates self-directed and student-centered learning, enabling learners to access educational resources at their own speed and degree of proficiency (Kundu & Bej, 2021). Furthermore, technology facilitates more contextual and authentic learning (Herrington et al., 2010) through the incorporation of virtual reality elements, simulations, and real-time interactions with native speakers, hence enhancing the significance and efficacy of language mastery. Empirically, Table 2 below illustrates the correlation between the practices and the examination of technology utilisation and its effects on children's development.

Table 2
Thematic Synthesis Matrix (Language Learning and the Use of Technology)

No.	Researcher(s) & Year	Country	Type	Sample	Indexed Status	Method	Best Practices Identified
1	Marsh et al. (2017)	Great Britain	Non-Jawi Learning Article	4 children (2 boys, 2 girls), aged 2–4 years	Web of Science	Qualitative (case study, parent observations, interviews)	Parental involvement as co-researchers strengthens digital literacy through home-based multimedia activities.
2	Eutsler et al. (2020)	United States of America		43 studies involving thousands of preschool to Grade 5 students	Web of Science	Systematic review (mixed methods: qualitative & quantitative)	Interactive mobile applications aligned with literacy objectives show improvements in reading and writing skills.
3	McLelland (2024)	Nez Zealand		Not explicitly stated (conceptual article based on previous studies)	Web of Science	Qualitative (theoretical analysis and review of educational technology)	Real-world, hands-on technology experiences support cognitive development, consistent with Piaget's theory.
4	Neumann (2017)	Australia		109 preschool children (survey of parents)	Web of Science	Quantitative (correlational study on tablet use and literacy skills)	Guided tablet use at home and preschool enhances writing and letter recognition skills.
5	Teichert et al. (2021)	Canada		60 popular media articles critically analyzed	ProQuest	Qualitative (content analysis of media and social narratives)	Digital literacy should be supported alongside print materials and

							teacher guidance to avoid confusion in early literacy practices.
6.	Ahmad et al. (2024)	Malaysia	Jawi Learning Article	15 early childhood education experts	Malaysia Citation Index	Qualitative (Design and Development Research + Fuzzy Delphi)	Expert-driven gamification design enhances preschoolers' engagement and recognition of Jawi letters.
7.	Ghazali et al., (2025a)			2 Jawi apps reviewed (no child sample mentioned)	Excellence in Research for Australia (ERA)	Qualitative (Content analysis + rubric evaluation)	Phonetic and multimedia-based digital apps effectively boost motivation and Jawi literacy.
8.	Ghazali et al., (2025b)			Conceptual study (no empirical sample)	Excellence in Research for Australia (ERA)	Qualitative (Literature synthesis + pedagogical framework)	Child-centered digital narratives and phonological awareness help address literacy barriers.

The thematic synthesis matrix indicates that the research collectively highlights the significance of technology in advancing early language and literacy development. Global studies (e.g., Marsh et al., 2017; Neumann, 2017) underscore the advantages of parental engagement and structured tablet usage in enhancing fundamental abilities like writing and letter recognition. Systematic reviews and theoretical studies (e.g., Eutsler et al., 2020; McLelland, 2024) underscore the significance of interactive and practical technological applications for literacy development. In the context of Jawi literacy from Islamic views, Malaysian research (Ahmad et al., 2024; Ghazali et al., 2025a, 2025b) demonstrate that gamification, multimedia tools, and phonological methods substantially improve motivation and recognition of Jawi letters. These findings underscore the necessity for a balanced integration of teacher support and printed resources (Teichert et al., 2021). Digital tools, when purposefully planned and applied for educational objectives, can significantly enhance early reading, particularly in culturally distinctive scripts such as Jawi.

In the realm of Jawi instruction, the integration of technology is crucial to tackle contemporary issues, including the scarcity of engaging educational resources (Elman et al., 2023), restricted instructional time, and the disparity in students' enthusiasm for Jawi script. Utilising intelligent applications like SmartJawi (Ghazali et al., 2025b), interactive animations (Sari & Wahyuni, 2022), online games, and educational videos (Shute & Venture, 2013), children can identify Jawi letters, articulate them accurately, and write them with engaging and comprehensible visual support. Technology enables educators to provide knowledge in a more systematic, flexible manner, according to the cognitive development levels of children, hence enhancing the efficacy of Jawi instruction among the youth. This exploratory study was conducted to address three research hypotheses, specifically:

1. H_{11}: The use of the SmartJawi App significantly enhances children's motivation to study Jawi.
2. H_{12}: The use of the SmartJawi App significantly enhances children's Jawi reading skills.
3. H_{13}: The use of the SmartJawi App significantly enhances children's proficiency in Jawi writing.

Methodology

Research Design

This study employed a quantitative approach (Cresswell, 2014) utilising a pre-test and post-test methodology to assess the efficacy of the intervention on Jawi learning in children. The intervention occurred over one week (four days; one hour per day), during which participants engaged in learning sessions utilising the developed SmartJawi App (refer to Figure 1). The pre-test was administered prior to the intervention to assess the participants' initial mastery level, whereas the post-test was conducted subsequent to the intervention to evaluate changes or enhancements in performance. The collected data were statistically analysed to assess the intervention's effect on participants' achievement.

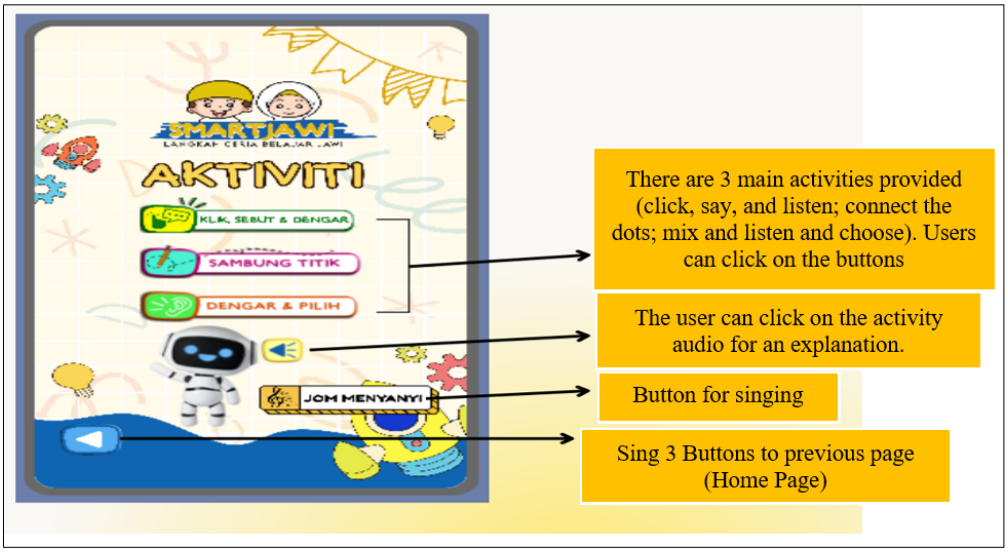

Figure 1: SmartJawi App

Sampling

The study sample consisted of a kindergarten educator and five five-year-old children enrolled in a private kindergarten in Jelawat, Bachok, Kelantan. The Sultan Ismail Petra International Islamic University College (KIAS) formally designated the teacher as a study informant,

utilising the Informant Appointment Form numbered KIAS/HEA/0.6/00/13. The selection for children's involvement was based on age appropriateness and intervention requirements. Prior to the study, written consent was secured from parents or guardians using a Consent Form. This measure was implemented to guarantee adherence to ethical considerations and the safeguarding of children's rights during the entire study procedure.

Instrument

The primary tool employed in this research is the Pre-Test and Post-Test referred to as the Early Jawi Literacy Assessment Instrument (IPLJA). This instrument was developed by the researchers and has attained a high level of consensus, evidenced by a Cohen's Kappa value of 1.00. This signifies complete concordance between two specialists in the domain about the evaluation of the things created in this instrument. This Instrument was designed to evaluate children's Jawi literacy levels prior to and during the intervention. This instrument highlights three primary variables:

1. Learning Motivation
2. Reading Skills
3. Writing Skills

Each variable is assessed by multiple items organised according to the requirements of early childhood development and the goals of Jawi education. Table 3 below presents the structures and items utilised in the I Early Jawi Literacy Assessment Instrument (IPLJA).

Table 3
Early Jawi Literacy Assessment Instrument (IPLJA)

Variable.	**Construct**	Item
1. Learning Motivation	1. Social Perseverance with Teachers When Learning Jawi	1 – 5
	2. Satisfaction When Succeeding in Learning Jawi	6 – 10
	3. Ability to Learn Quickly in Jawi	11 – 15
2. Reading Skills	1. Introduction of Jawi Letter	16 – 25
3. Writing Skills	1. Fine Motor Skills & Pencil Control	26 – 35

Data Analysis

The data from the Pre-Test and Post-Test were analysed utilising the Statistical Package for the Social Sciences (SPSS) software. This research aimed to discern the disparities in accomplishment scores of the study participants prior to and during the intervention. Using SPSS, mean comparison tests, including the Paired Sample t-Test, were performed to assess significant changes in the three primary variables examined (Pallant, 2020): writing skills, reading skills, and learning motivation. This investigation assessed the efficacy of the intervention applied to enhance early childhood Jawi literacy.

Findings

Overall findings

Table 4

Total Scores for the Pre and Post-Tests for All Three Variables

Construct / Item	**Participants Pre-Test**					**Post-Test**				
Sample	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
Motivation	**Marks**					**Marks**				
1	4	4	4	4	4	4	5	4	4	4
2	4	4	4	4	4	4	6	4	4	4
3	5	4	4	4	4	4	5	4	5	4
4	3	4	4	4	3	3	4	4	4	3
5	4	4	4	4	4	4	6	4	4	4
6	4	4	4	4	3	5	6	4	4	4
7	4	4	4	4	3	5	5	4	4	4
8	4	4	4	4	3	5	6	4	4	4
9	4	4	4	4	3	5	6	4	4	4
10	4	4	4	4	4	5	6	4	4	4
11	3	3	3	3	3	3	4	3	5	3
12	4	4	3	3	3	4	5	3	4	4
13	4	4	4	4	4	5	4	4	4	4
14	4	3	4	4	3	4	5	3	4	3
15	3	4	3	4	3	5	5	3	4	3
Reading	**Marks**					**Marks**				
1	3	4	5	5	4	3	5	4	5	4
2	4	4	5	5	3	5	5	4	5	4
3	3	3	4	4	4	4	5	4	4	4
4	3	4	4	4	3	3	4	4	4	3
5	3	3	4	4	3	4	4	4	4	3
6	4	4	4	4	3	4	5	4	4	3
7	3	3	4	4	3	4	5	4	4	3
8	3	3	3	3	3	3	4	3	4	4
9	3	3	3	3	3	4	5	3	3	4
10	3	4	4	4	3	4	6	4	4	4
Writing	**Marks**					**Marks**				
1	4	4	4	4	5	4	6	4	4	5
2	3	4	4	4	4	4	5	4	4	4
3	4	4	4	4	4	4	6	4	4	4
4	3	3	4	4	3	3	5	4	4	4
5	4	4	4	4	4	4	5	4	4	4
6	4	3	4	4	3	4	4	4	4	3
7	3	3	3	3	3	3	4	3	3	3
8	3	3	4	3	4	4	5	3	4	4
9	3	3	3	3	4	4	5	3	3	4
10	3	3	3	4	3	3	4	3	4	4

According to Table 4, the scores of all three constructs which are learning motivation, reading, and writing has improved steadily from the pre-test to the post-test. Overall, the pre-test scores were mostly between 3 and 4, with only a few differences. This shows that the beginning performance was average. On the other hand, post-test scores show clear

improvements, with several items getting ratings of 5 or 6, especially in the Motivation and Writing areas. Most participants scored about 4 on the Motivation exam at first, but after the test, numerous things scored 5 or 6, demonstrating that they were more interested and had a better attitude. Reading also got better, though not as much. The scores went from primarily 3s (s = scores of) and 4s to mostly 4s and 5s, which suggests that the students understood the material better. Writing showed a substantial upward trend, with some individuals going from scores of 3 to 6, which means that their writing skills improved in terms of structure and language. These findings suggest that the intervention or instructional support provided (refer to Figure 2) between the pre- and post-assessments was effective in enhancing students' motivation and literacy skills. The gains, while not uniform across all participants, demonstrate positive academic development across all constructs.

Figure 2: The Intervention Conducted by An Experience Educator

RQ1: Does the SmartJawi App enhance children's motivation to study Jawi?

Table 5

Paired Sample t-test Result (Learning Motivation)

	PreTest	**PostTest**
Mean	3.9	4.1
	3.9	5.1
	3.7	3.7
	3.8	4.1
	3.5	3.7

Table 5 presents the outcomes of a paired sample t-test conducted to evaluate the efficacy of the SmartJawi App in enhancing users' motivation to learn Jawi. The research examined five individuals and analysed their motivation levels prior to and after to the intervention. The findings indicated an increase in the average score from the pre-test (M = 3.73, SD = 0.56) to the post-test (M = 4.40, SD = 0.51). The enhancement was statistically significant, with t(4) = -5.06 and p = 0.007 (two-tailed), indicating that the SmartJawi App exerted a genuine beneficial influence on learners' motivation. The p-value being less than 0.05 indicates that the observed difference is likely not a mere coincidence. This indicates that the alternative hypothesis (H_{11}) is valid, signifying that the intervention significantly enhanced the individuals' motivation. The results indicate that the software may serve as an effective digital learning instrument for facilitating early acquisition of Jawi.

RQ2: Does the SmartJawi App enhance children's Jawi reading skills?

Table 6

Paired Sample t-test Result (Reading)

	PreTest	PostTest
Mean	3.3	3.8
	3.5	4.8
	4.0	3.8
	3.9	4.0
	3.2	3.8

Table 6 displays the results of a paired sample t-test performed to assess the impact of the SmartJawi App on children's Jawi reading proficiency. The assessment evaluated the average reading scores of five individuals prior to and during the intervention. The results indicated a modest elevation in the mean score from the pre-test (M = 3.58, SD = 0.36) to the post-test (M = 4.04, SD = 0.43). Nonetheless, this enhancement was not statistically significant, t(4) = -1.81, p = 0.145 (two-tailed), suggesting that the noted disparity may be attributable to random variation. Given that the p-value surpasses the 0.05 significance threshold, the alternative hypothesis (H_{12}), which asserted that the SmartJawi App significantly improves children's reading abilities, is dismissed. The findings indicate that, despite a favourable trend, the intervention did not yield a statistically significant effect on participants' reading proficiency.

RQ3: Does the SmartJawi App enhance children's proficiency in Jawi writing?

Table 6

Paired Sample t-test Result (Learning Motivation)

	PreTest	PostTest
Mean	3.3	4.4
	3.9	4.3
	4.0	4.3
	3.4	3.6
	3.3	3.8

Table 6 illustrates that a paired sample t-test was conducted to assess the effect of the SmartJawi App on children's Jawi writing proficiency. The assessment evaluated the average writing scores of five participants prior to and following the intervention. The results demonstrated an elevation in the mean score from the pre-test (M = 3.58, SD = 0.31) to the post-test (M = 4.08, SD = 0.33). The difference was statistically significant, t(4) = -5.02, p = 0.007 (two-tailed), indicating that the intervention exerted a substantial impact on writing performance. The statistically significant enhancement corroborates the Alternative Hypothesis (H_{13}), indicating that the SmartJawi App effectively improves children's writing proficiency in Jawi. The findings present empirical evidence that the digital intervention can effectively enhance writing skill and may be regarded as a feasible method for fostering Jawi literacy development in early learners.

Conclusion

The findings of this study indicate that the SmartJawi App positively influenced children's motivation and literacy skills in Jawi, especially in writing. The comprehensive analysis indicated substantial enhancements in post-test scores across the three domains: learning motivation, reading, and writing. The most significant improvement was noted in learning desire, with participants' average scores markedly rising, corroborated by a statistically significant result ($p = 0.007$). This indicates that the software successfully engaged learners and enhanced their excitement for studying Jawi. Correspondingly, writing skills shown a notable enhancement, evidenced by a distinct increase in scores and statistical validation of the application's efficacy ($p = 0.007$). The results indicate that the SmartJawi App facilitates the enhancement of both motivation and writing proficiency. Although reading scores improved from pre-test to post-test, the rise was not statistically significant ($p = 0.145$), suggesting a more modest effect in this domain. Nevertheless, the overarching tendency among all three constructs endorses SmartJawi as a promising digital learning instrument. The software demonstrates potential in improving early learners' Jawi literacy, particularly in cultivating motivation and writing skills, and may act as a beneficial complement to conventional teaching techniques.

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