Available online on the website:
https://ftk.uinbanten.ac.id/journals/index.php/tarbawi

TARBAWI
Jurnal Keilmuan Manajemen Pendidikan

Tarbawi: Jurnal Keilmuan Manajemen Pendidikan
p-ISSN: 2442-8809 | e-ISSN: 2621-9549
Vol. 11, No. 01, 2025, 21-30

Development of Website-Based Digital Teaching Materials for the Jarimatika Qur'an Method: A Local Content Integration Approach

Rizki Muthmainnah Amir, Arismunandar, Nurhikmah H

Universitas Negeri Makassar, Indonesia
e-mail: rizkimuthmainnahamir@gmail.com, arismunandar@unm.ac.id, nurhikmah.h@unm.ac.id

Submitted: 06-01-2025 Revised: 18-03-2025 Accepted: 13-04-2025

ABSTRACT. This study employs a research and development approach to identify the need, design, validity, practicality, and effectiveness of website-based digital teaching materials for the Jarimatika Qur'an Method as local content. The development process follows the 4D model (Define, Design, Develop, and Disseminate). Data collection involved observations, document analysis, and questionnaires, analyzed quantitatively and qualitatively. The study participants included media and content experts, one first-grade teacher, and 21 first-grade students. The results indicate that: (1) students require website-based digital teaching materials to enhance their learning experience; (2) the developed digital teaching material was successfully implemented in the form of a website; (3) expert validation confirmed that the materials are valid and feasible for use; (4) teacher feedback classified the material as practical; and (5) effectiveness analysis based on student learning outcomes demonstrated a significant improvement (p<0.05). This study suggests that website-based digital teaching materials facilitate independent learning and enhance students' engagement in Qur'an memorization.

Keywords: *Al-Quran jarimatika method, digital teaching materials, local content, website*

https://dx.doi.org/10.32678/tarbawi.v11i01.11203

How to Cite Amir, R. M., Arismunandar, A., & Nurhikmah, H. (2025). Development of Website-Based Digital Teaching Materials for the Al-Quran Jarimatika Method: A Local Content Integration Approach. *Tarbawi: Jurnal Keilmuan Manajemen Pendidikan*, *11*(01), 21–30. https://doi.org/10.32678/tarbawi.v11i01.11203

INTRODUCTION

Quranic education plays an important role in shaping students' character and spiritual skills from an early age (Jaafar et al., 2014; Colina & Listiana, 2021). One of the methods used in learning to memorize the Qur'an in elementary schools is the Jarimatika Qur'an Method, which is a memorization technique based on finger joints that helps students remember and repeat verses systematically (Hikmah et al., 2013; Hijriati et al., 2023). However, in practice, this method still relies on conventional face-to-face learning and direct instruction from the teacher. This approach has limitations, especially in providing students with flexible and independent learning experiences (Dewi, 2024).

Along with the development of educational technology, various studies have shown that the integration of technology in learning can increase the effectiveness and engagement of students (Yahya et al., 2021; Santoso et al., 2022; Bakar et al., 2022; Hakimi et al., 2024; Sukmawati, 2024). Digital-based learning, primarily through website platforms, allows wider access, provides interactive content, and supports various student learning styles (Castillo-Merino & Serradell-López, 2014; Zen & Ariani, 2022). In learning the Qur'an, the use of website-based digital media can help students memorize more effectively, especially with audio features that allow them to hear, repeat, and adjust

the tempo of memorization according to individual needs (Purbohadi et al., 2019; Haryono et al., 2023; Idawati & Hanifudin, 2024).

Although several studies have discussed the effectiveness of digital teaching materials in Islamic education (Hidayat et al., 2021; Ansyah, 2022; Ahmad et al., 2025), research that develops explicitly website-based digital teaching materials for the Jarimatika Qur'an Method is still limited. Most previous studies have focused more on mobile applications or the use of multimedia in learning the Qur'an in general (Musa et al., 2018; Fanani et al., 2021; Nurfadilah, 2023; Fajrie et al., 2023; Jannah et al., 2024). Therefore, there is a research gap (gap analysis) in developing website-based teaching materials that support the Jarimatika method with features tailored to improve students' memorization abilities.

This study aims to develop website-based digital teaching materials specifically designed to support the Jarimatika method in learning the Qur'an. This development refers to the 4D model (Define, Design, Develop, Disseminate) to ensure the validity, practicality, and effectiveness of the teaching materials produced. With this website-based teaching material's existence, students are expected to learn more independently and flexibly and gain a more meaningful learning experience in memorizing the Qur'an. In addition, this study also contributes to enriching the literature related to the use of technology in Qur'an education. It provides recommendations for curriculum developers and educators in integrating digital technology in tahfidz learning.

METHOD

This study uses Thiagarajan's 4D research and development model, as quoted by Indaryanti et al. (2025), which consists of four stages: Define, Design, Develop, and Disseminate. The Define stage involves analyzing learning needs, identifying problems in implementing the Jarimatika Qur'an method and determining learning objectives. The Design stage focuses on developing an initial prototype of website-based digital teaching materials, including creating storyboards and interface designs. The development stage includes expert validation and trials to assess the teaching materials' feasibility, practicality, and effectiveness. Finally, the Disseminate stage aims to apply the developed teaching materials on a broader scale.

Participant

This study involved 21 first-grade students, one class teacher at the Islamic Elementary School Bait Qurany Nurul Anwar, and two expert validators (one media expert and one material expert). The participants were selected using a *purposive sampling technique* to ensure that the teachers involved had experience implementing the Jarimatika Qur'an method and that students were active in the tahfidz learning program.

Data collection

Data collection was conducted using several techniques to ensure a comprehensive evaluation. *Observation* - This was conducted to analyze classroom interactions and student engagement with digital teaching materials. *Document Analysis* - Reviewing existing materials in the Jarimatika Qur'an method as a guide in content development. *Expert Validation* - Assessing the validity of website-based teaching materials through structured assessment instruments. *Pre-Test and Post-Test* - Measuring the increase in students' ability to memorize the Qur'an before and after using digital teaching materials.

Data analysis

The collected data were analyzed using quantitative and qualitative approaches. Descriptive statistics were used to assess the validity and practicality scores of expert validators and teacher responses. Paired t-tests were conducted to compare students' pre-test and post-test scores to

determine the effectiveness of website-based digital teaching materials in improving Qur'an memorization skills.

RESULT AND DISCUSSION

Result

The development of website-based digital teaching materials is carried out based on three main objectives: (1) identifying the need to develop website-based digital teaching materials for the Jarimatika Qur'an method, (2) designing website-based digital teaching materials that are appropriate to learning needs, and (3) evaluating the level of validity, practicality, and effectiveness of the teaching materials developed.

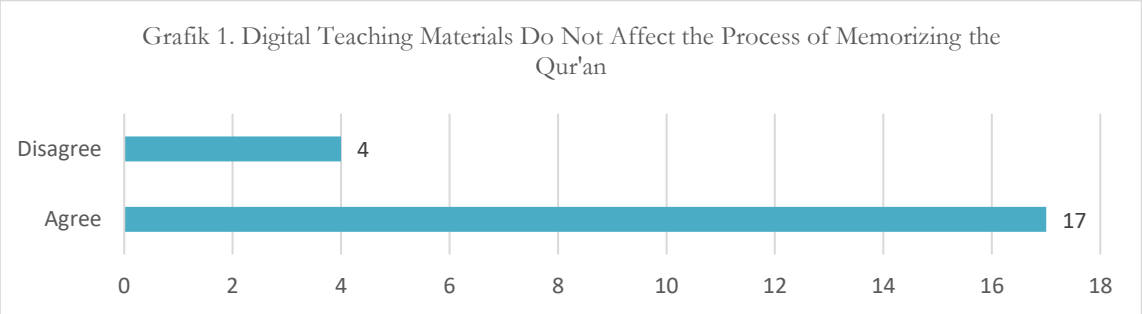
Analysis of Needs for Developing Website-Based Digital Teaching Materials

Needs analysis is the first step in designing digital teaching materials on the characteristics of students and teachers. This process aims to ensure that the teaching materials developed support learning objectives and can be implemented effectively in the learning environment at the Islamic Elementary School Bait Qurany Nurul Anwar. By understanding the specific needs in learning tahfidz using the Jarimatika method, the development of website-based digital teaching materials can be more targeted and provide optimal benefits for students and teachers. The stages of needs analysis carried out can be seen in Table 1 below.

Table 1. Stages of Needs Analysis

Stages of Needs Analysis	Description
Initial Analysis	Identifying challenges faced in learning *tahfidz* using the Jarimatika method.
Teacher and Student Analysis	Assessing the readiness of teachers and students to use digital technology.
Task Analysis	Determine the scope of material to be included in digital teaching materials.
Concept Analysis	Develop a content structure based on the tahfidz curriculum based on the Jarimatika method.
Formulation of Learning Objectives	Setting learning targets to be achieved through website-based digital teaching materials.

An analysis was undertaken to assess students' requirements for digital teaching resources in memorizing the Qur'an, focusing on the level of interest and the efficacy of digital media usage. This analysis aims to determine how much digital teaching materials can help students memorize the Qur'an more flexibly and effectively. The results of the analysis are seen in Graph 1 below.



Graph 1 above shows that most students (80.95 %) agree that digital learning materials can improve their understanding of memorizing the Qur'an. Only a small number of students (19.05%) feel that digital learning materials are not helpful in memorization. This finding shows that the

development of digital learning materials is very much needed as an alternative learning source that is more flexible and effective in supporting the achievement of students' memorization targets.

Validity of Website-Based Digital Teaching Materials

Media and material experts validated the developed website-based digital teaching materials to ensure that they meet learning quality standards. This validation aims to assess the feasibility of teaching materials in terms of display design, content suitability, ease of use, and clarity of instructions. The validation results obtained can be seen in Table 2 below.

Table 2. Validation Results of Media Experts and Material Experts

Assessment Aspects	Score		Category
	Media Expert	Subject Matter Expert	
Display Design	4.5	-	Valid
Content Suitability	-	4.7	Valid
Ease of Use	4.4	-	Valid
Clarity of Instructions	-	4.6	Valid
Average Score	4.45	4.7	Valid

Based on the table above, the digital teaching materials are declared valid and suitable for learning the Jarimatika Al-Qur'an method.

Practicality of Website-Based Digital Teaching Materials

The practicality of the teaching materials was tested through the responses of teachers who used them in learning. The evaluation results showed that the teaching materials met the practical criteria with a usability rate of 87.5%. Teachers assessed that the features available in the teaching materials facilitated the learning process and increased student interaction with memorization materials. The results of evaluating the practicality of digital teaching materials can be seen in Table 3 below.

Table 3. Results of Practicality Test by Teachers

Assessment Aspects	Average Score	Category
Ease of Access	4.6	Very Practical
Suitability to Needs	4.5	Very Practical
Interactivity	4.4	Practical
Support for Independent Learning	4.7	Very Practical
Average Practicality	4.55	Very Practical

These results show that website-based digital teaching materials greatly support the learning process of the Jarimatika Qur'an method.

Effectiveness of Website-Based Digital Teaching Materials

The effectiveness of the teaching materials was measured using a pre-test and post-test involving 21 grade I students. The statistical test results showed an increase in the average score from 72.8 (pre-test) to 82.5 (post-test). The results of the digital teaching material effectiveness test can be shown in Table 4 below.

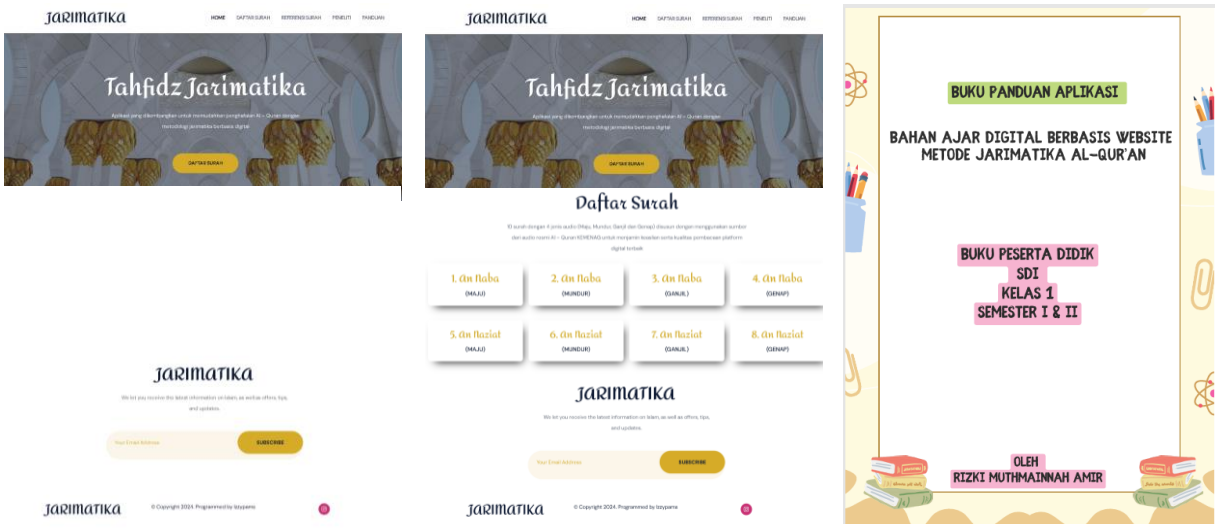
Table 3. Results of the Digital Teaching Materials Effectiveness Test

Types of Tests	Average Score	Improvement
Pre-test	72.8	-
Post-test	82.5	+9.7

Analysis using paired t-test produced a significance value of $p = 0.536$ ($p<0.05$), which shows that website-based digital teaching materials have a positive impact on improving student learning outcomes in memorizing the Qur'an.

Dissemination of Website-Based Digital Teaching Materials

The digital teaching materials that have been developed are then applied in another class, namely class I An-Naba, to see how effective they are in different learning environments. This implementation aims to test the generalization of the teaching materials and obtain feedback from a broader range of users. The results of all stages of this study indicate that the website-based digital teaching materials for the Jarimatika Qur'an method have a high level of validity, good practicality, and significant effectiveness in improving student learning outcomes. Thus, this teaching material is recommended as an innovative learning medium to support tahfidz learning in elementary schools.



(a) *(b)*

Figure 1. *(a)* Display of Website-Based Digital Teaching Materials (https://tahfidzjarimatika.my.id/); *(b)* Application Guide Book

Discussion

The learning needs analysis emphasizes the importance of developing website-based digital teaching materials to support the implementation of the Jarimatika Qur'an method in Class I Al-Fajr in the 2024-2025 academic year. The findings show that the current learning approach is still less than optimal in facilitating students' memorization of the Qur'an, so integrating digital teaching materials is needed to improve learning effectiveness. In line with research by Hilman (2025) and Mustakim et al. (2025), digital learning platforms have been shown to increase cognitive engagement and retention in religious education. Therefore, developing website-based media is an important step in overcoming the limitations of conventional methods and creating a more structured and interactive memorization process.

The design process was based on an in-depth needs analysis, ensuring that it met the specific needs of students in Class I Al-Fajr at Bait Qurany Nurul Anwar Islamic Elementary School. This digital teaching material addresses the learning challenges in the Jarimatika Qur'an method. Evaluation was conducted through pre-tests and post-tests to measure students' understanding of the material, which aligns with best practices in learning design. It is in line with Emerson (2016) that pre-tests and post-tests are conducted to measure changes or improvements in students' understanding, skills, or performance before and after participating in an intervention or learning.

One of the main features of this website is its user-centered design, with usability principles ensuring an intuitive and accessible interface. The development process prioritized multimedia integration, using audiovisual content to enhance student engagement and understanding. The website flowchart was systematically designed to facilitate smooth navigation, minimize technical barriers, and ensure optimal accessibility for learners. These considerations align with contemporary digital learning frameworks that emphasize usability and accessibility as critical factors in the effectiveness of educational technology (Seale & Cooper, 2010; Seale, 2013; Alexiou & Schippers, 2018).

The validation results of the media and design components showed a high feasibility level, with scores ranging from 4 to 5 on various main assessment criteria, including usability, interface design, and pedagogical effectiveness. The aspects with the highest scores were the layout appropriateness and the teaching materials' clarity, which confirmed the relevance of the design principles used. Although the media components showed superiority in supporting independent learning, minor improvements were needed to improve the visual appeal and overall instructional effectiveness. The total validity score of 4.45 reflects a strong validity level so that this digital teaching material can be applied to learning. This finding aligns with previous research that highlights the role of multimedia in increasing student learning engagement and retention (Wankel & Blessinger, 2013).

Practicality was evaluated through teacher assessment, with the primary instructor of Class I Al-Fajr, Mrs. Siska, and providing feedback through a structured questionnaire. The assessment results showed that this teaching material has a high level of ease of use, with an average score of 4, especially in the accessibility of instruction-based audio features (e.g., sequential and random verse playback). This teaching material also shows high compatibility with various devices, thus supporting flexibility in diverse learning environments. It is reinforced by Ghoulam et al. (2024) that mobile devices play an important role in e-learning and allow flexible access to educational content across multiple platforms to increase engagement and knowledge retention.

Although the user interface was appreciated for its responsiveness, there is scope for further improvement in enhancing motivational elements to maintain student engagement. The usability aspect scored 3, indicating that there is still room for further development, such as integrating interactive elements and gamification to enrich the learning experience. Nevertheless, the total practicality score of 87.5% confirms the feasibility of this digital teaching material to be integrated into classroom learning, as supported by other research findings related to the effectiveness of digital tools in early childhood Qur'an education (Saptiani & Sofyan, 2022; Razali et al., 2023; Faqihuddin et al., 2024).

Effectiveness was measured through a large group trial using the pre-test and post-test methods. The results showed a significant increase in student learning outcomes, with the average score increasing from 72.8 (pre-test) to 82.5 (post-test), reflecting an increase of 9.7 points or 83%. Statistical analysis using SPSS produced a significance value of 0.536, confirming the reliability of the observed increase in learning outcomes. These results align with previous studies that highlight the positive impact of website-based digital teaching materials on students' academic achievement in Qur'an education (Yunus et al., 2023; Saputri & Jasiah, 2025).

In addition, students demonstrated higher levels of mastery after the intervention, with a post-test pass rate of 83%, indicating a significant increase in understanding of the material. These findings confirm the pedagogical value of web-based digital learning materials in supporting Qur'an memorization through a more structured and interactive learning approach. Further research is needed to explore the impact of long-term retention and the potential application of these learning materials in broader educational contexts.

CONCLUSION

This study successfully developed website-based digital teaching materials adapted to the Jarimatika Qur'an method using the 4D development model. The findings of this study underscore the importance of digital resources in improving students' memorization and engagement in memorizing the Qur'an. Expert validation confirmed the validity and feasibility of the materials, while teacher assessments demonstrated their practicality. Furthermore, statistical analysis showed a significant increase in students' memorization ability (p<0.05) after using the developed materials. These results underscore the potential of website-based digital teaching materials in encouraging independent learning and optimizing Qur'an education. Future research should explore broader implementation and long-term effects on student learning outcomes.

BIBLIOGRAPHY

Ahmad, K. A., Asni, F., Hasbulah, M. H., Hashom, H., Mustafa, W. A., Noor, A. M., & Nasir, K. (2025). Mobile learning of Islamic studies: A comprehensive review. *Journal of Advanced Research in Applied Sciences and Engineering Technology*, *48*(2), 211-224. https://doi.org/10.37934/araset.48.2.211224

Alexiou, A., & Schippers, M. C. (2018). Digital game elements, user experience and learning: A conceptual framework. *Education and Information Technologies*, *23*, 2545-2567. https://doi.org/10.1007/s10639-018-9730-6

Ansyah, E. (2022). The role of digital learning in Islamic education: An analysis of acceptance technology in Indonesia. *Eurasian Journal of Educational Research (EJER)*, (102). https://doi.org/10.14689/ejer.2022.102.002

Bakar, B. A., Zakaria, M. F., Mohamad, M. R., & Ramlan, M. A. F. (2022). Management of learning and memorizing al-Quran using virtual learning environment during pandemic. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, *7*(7), e001611-e001611. https://doi.org/10.47405/mjssh.v7i7.1611

Castillo-Merino, D., & Serradell-López, E. (2014). An analysis of the determinants of students' performance in e-learning. *Computers in Human Behavior*, *30*, 476-484. https://doi.org/10.1016/j.chb.2013.06.020

Colina, N., & Listiana, A. (2021). Al-Quran Based Learning in Early Childhood Education. In *5th International Conference on Early Childhood Education (ICECE 2020)* (pp. 19-22). Atlantis Press. https://doi.org/10.2991/assehr.k.210322.005

Dewi, S., Azizah, I. N., & Wawan, W. (2024). Eksplorasi konsep matematika pada metode jarimatika al-Qur'an. *Delta-Phi: Jurnal Pendidikan Matematika*, *2*(1), 1-14. https://doi.org/10.61650/dpjpm.v2i1.533

Emerson, R. W. (2016). Measuring change: pitfalls in research design. *Journal of Visual Impairment & Blindness*, *110*(4), 288-290. https://doi.org/10.1177/0145482X1611000412

Fajrie, M., Arianto, D. A. N., Surya, Y. W. I., & Aminulloh, A. (2023). Al-Quran Digitalization: Adolescent View on the Value of the Digital Al-Quran Application. *Jurnal Komunikasi: Malaysian Journal of Communication*, *39*(1), 92-106. https://doi.org/10.17576/JKMJC-2023-3901-06

Fanani, L., Brata, K. C., Brata, A. H., & Fauzi, M. A. (2021). Gamification for Mobile-Based Al-Quran Writing Learning Applications. *International Journal*, *9*(2), 49-55. https://doi.org/10.30534/ijeter/2021/06922021

Faqihuddin, A., Firmansyah, M. I., & Muflih, A. (2024). Multisensory approach in memorizing the Al-Quran for early childhood: Integration of the tradition of memorizing the Al-Quran with digital technology. *Al-Ishlah: Jurnal Pendidikan*, *16*(2), 1289-1302. https://doi.org/10.35445/alishlah.v16i2.5326

Ghoulam, K., Bouikhalene, B., Babori, A., & Falih, N. (2024). Exploring the impact of mobile devices in electronics e-learning: A case study evaluating the effectiveness of mobile learning applications in the field of electronics and sensors. *Advances in Mobile Learning Educational Research*, *4*(2), 1058-1072. https://doi.org/10.25082/amler.2024.02.001

Hakimi, M., Akrami, M., Ahrari, M., Akrami, K., & Akrami, F. (2024). The impact of mobile applications on Quran education: A survey of student performance and satisfaction. *Journal of Digital Learning and Distance Education*, *2*(9), 722-736. https://doi.org/10.56778/jdlde.v2i8.220

Haryono, K., Rajagede, R. A., & Negara, M. U. A. S. (2023). Quran memorization technologies and methods: Literature review. *IJID (International Journal on Informatics for Development)*, *11*(1), 192-201. https://doi.org/10.14421/ijid.2022.3746

Hidayat, A., Fatimah, S., & Rosidin, D. N. (2021). Challenges and prospects of Islamic education institutions and sustainability in the digital era. *Nazhruna: Jurnal Pendidikan Islam*, *5*(2), 351-366. https://doi.org/10.31538/nzh.v5i2.2106

Hijriati, H., Hayati, Z., & Karnisah, K. (2023). Jarimatika method of daily prayer: Does it affect children's spiritual intelligence?. *Aṭfālunā Journal of Islamic Early Childhood Education*, *6*(1), 61-70. https://doi.org/10.32505/atfaluna.v6i1.6042

Hikmah, N., Habiburrahmanuddin, N., & Urotun, P. (2013). *Bait qur'any menghafal semudah menggerakkan jari tangan dengan matematika al-Qur'an*. Yayasan Bait Qur'any At-Tafkir.

Hilman, C. (2025). Digital-Based Islamic religious Education: A New Orientation in Enhancing Student Engagement and Spiritual Understanding. *The Journal of Academic Science*, *2*(1), 53-65. https://doi.org/10.59613/66eafx60

Idawati, K., & Hanifudin, H. (2024). Development of al-Qur'an memorization techniques based on computer file models: learning innovation in Islamic education. *Syamil: Jurnal Pendidikan Agama Islam (Journal of Islamic Education)*, *12*(1), 119-138. https://doi.org/10.21093/sy.v12i1.9198

Indaryanti, R. B., Harsono, H., Sutama, S., Murtiyasa, B., & Soemardjoko, B. (2025). 4D research and development model: Trends, challenges, and opportunities review. *Jurnal Kajian Ilmiah*, *25*(1), 91-98. https://doi.org/10.31599/na7deq07

Jaafar, N., Raus, N. M., Muhamad, N. A. F., Ghazalid, N. M., Amat, R. A. M., Hassan, S. N. S., ... & IsaHamzah, M. (2014). Quran education for special children: teacher as murabbi. *Creative Education*, *5*(7), 435-444. http://dx.doi.org/10.4236/ce.2014.57053

Jannah, U., Sulthoni, A., & Ridho, M. (2024). An Analytical Study of the Quranic Tafsir Translation in the" Al-Quran Terjemahan Tafsir" Application. *Jurnal Ilmiah Al-Mu'ashirah: Media Kajian Al-Qur'an dan Al-Hadits Multi Perspektif*, *21*(2), 232-243. https://dx.doi.org/10.22373/jim.v21i2.24474

Musa, M. G. B., Yusop, M. H. N. B., Sopee, M. M. B. M., & Ali, N. A. M. (2018). I-Tasmik mobile platform–Enabling tahfiz student to memorize Al-Quran independently. In *2018 International Conference on Information and Communication Technology for the Muslim World (ICT4M)* (pp. 24-29). IEEE. https://doi.org/10.1109/ICT4M.2018.00014

Mustakim, A., Sahlan, M., Saihan, S., & Zainudin, A. (2025). Utilization of digital applications in improving student understanding of Islamic religious education subjects. *Islamic Management: Jurnal Manajemen Pendidikan Islam*, *8*(01), 135-148. https://doi.org/10.30868/im.v8i01.7792

Nurfadilah, N. (2023). Inovasi Digital dalam Murajaah Al-Qur'an: Potensi dan Relevansi Aplikasi Al-Qur'an Indonesia. *Journal of Society and Development*, *3*(1), 11-20. https://doi.org/10.57032/jsd.v3i1.110

Purbohadi, D., Rahmawati, B. R., & Setiyawan, H. (2019). Development of Qur'an memorization learning model based on mobile learning. In *Journal of Physics: Conference Series* (Vol. 1381, No. 1, p. 012029). IOP Publishing. https://doi.org/10.1088/1742-6596/1381/1/012029

Razali, K. S., Ismail, S., Mustafa, N. M., Baharuddin, S. A., Sapiuudin, U. U., & Yahaya, M. (2023). Development of digital application-based tahfiz learning models in early childhood

education. *Journal of Contemporary Social Science and Education Studies (JOCSSES) E-ISSN-2785-8774*, *3*(2), 14-21. https://doi.org/10.5281/zenodo.10154670

Santoso, H. B., Schrepp, M., Hasani, L. M., Fitriansyah, R., & Setyanto, A. (2022). The use of User Experience Questionnaire Plus (UEQ+) for cross-cultural UX research: evaluating Zoom and Learn Quran Tajwid as online learning tools. *Heliyon*, *8*(11). https://www.cell.com/heliyon/fulltext/S2405-8440(22)03036-5

Saptiani, S., & Sofyan, R. (2022). Developing a digital-based practical Qur'an learning book for prospective early childhood teachers. *Aṭfāluna Journal of Islamic Early Childhood Education*, *5*(2), 60-74. https://doi.org/10.32505/atfaluna.v5i2.3990

Saputri, M. J., & Jasiah, J. (2025). Penggunaan modul digital berbasis game based learning dalam meningkatkan keaktifan siswa pada mata pelajaran Al-Qur'an Hadist. *Journal Sains Student Research*, *3*(1), 407-416. https://doi.org/10.61722/jssr.v3i1.3529

Seale, J. (2013). *E-learning and disability in higher education: Accessibility research and practice*. Routledge.

Seale, J., & Cooper, M. (2010). E-learning and accessibility: An exploration of the potential role of generic pedagogical tools. *Computers & Education*, *54*(4), 1107-1116. https://doi.org/10.1016/j.compedu.2009.10.017

Sukmawati, A. (2024). Pemanfaatan Artificial intelligence untuk meningkatkan efisiensi pembelajaran al-Quran. *Dinamika Penelitian: Media Komunikasi Penelitian Sosial Keagamaan*, *24*(01), 53-72. https://doi.org/10.21274/dinamika.2024.24.01.53-72

Wankel, L. A., & Blessinger, P. (Eds.). (2013). *Increasing student engagement and retention using multimedia technologies: Video annotation, multimedia applications, videoconferencing and transmedia storytelling*. Emerald Group Publishing Limited. https://doi.org/10.1108/S2044-9968(2013)000006F013

Yahya, M. W. B. H., Rahman, T., & Siddiq, A. A. (2021). Online learning in the quran reading class during COVID-19 pandemic. *International Journal of Learning, Teaching and Educational Research*, *20*(5), 142-158. https://doi.org/10.26803/ijlter.20.5.8

Yunus, M., Ardiansyah, M. R., Jufri, J., Adyanata, A., Setiawan, A., & Rina, R. W. (2023). Pengaruh pembelajaran berbasis website terhadap hasil belajar siswa. *Jurnal Pendidikan Teknologi Informasi (Jukanti)*, *6*(2), 21-32. https://doi.org/10.37792/jukanti.v6i2.931

Zen, Z., & Ariani, F. (2022). Academic achievement: the effect of project-based online learning method and student engagement. *Heliyon*, *8*(11). https://www.cell.com/heliyon/fulltext/S2405-8440(22)02797-9