WEB PROGRAMMING TRAINING TO ENHANCE DIGITAL LITERACY OF MASTER'S STUDENTS IN ISLAMIC EDUCATION UNZAH

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Abstract

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The rapid development of digital technology demands educators to possess strong digital literacy and technological skills. However, many master's students in Islamic Education at UNZAH still have limited competencies in web-based technologies that support innovative learning and academic dissemination. This community service program aims to enhance digital literacy through web programming training for master's students in Islamic Education at UNZAH. The training covers fundamental web programming skills, including HTML, CSS, and basic web development concepts, and is implemented through lectures, hands-on practice, and guided mentoring. The results of the program indicate an improvement in participants' understanding of web programming concepts and their ability to develop simple educational websites. This training contributes to strengthening digital competence and supports the role of Islamic education graduates as adaptive and innovative educators in the digital era.

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INTRODUCTION

The rapid development of information and communication technology in the digital era has brought fundamental changes to various aspects of human life, including the field of education (Fansuri & Sofa, 2026). Digitalization has not only transformed the way people communicate and access information but has also influenced learning paradigms, teaching methods, and the roles of educators and learners (Basit et al., 2026). Higher education institutions are required to respond to these changes by preparing human resources who are not only academically competent but also adaptive to technological advancements (Marlina et al., 2026). In this context, digital literacy has

become a key competency that must be possessed by students as future intellectuals and agents of change in society (Fillah & Sofa, 2026).

Digital literacy is not merely defined as the ability to operate technological devices, but also includes critical, creative, and ethical thinking skills in utilizing digital technology for academic, professional, and social purposes. Students are expected to be capable of managing digital information, producing meaningful content, and using technology to support learning and knowledge development. At the master's level, these demands become increasingly significant, as students are prepared to serve as educators, researchers, and educational policymakers who are able to respond innovatively to global challenges (Khomsiyah & Sofa, 2026).

Master's students of Islamic Education (PAI) at the Graduate School of UNZAH hold a strategic position in the development of Islamic education that is relevant to contemporary dynamics. Islamic education is not only oriented toward mastering normative and theoretical Islamic knowledge, but is also required to adapt to digital technological developments so that Islamic values can be conveyed effectively and contextually. However, in practice, there are still limitations in students' ability to utilize digital technology productively, particularly in the development of web-based learning media and the use of digital platforms as academic and educational tools (Fansuri & Sofa, 2026).

The issue of digital literacy among Master's students of Islamic Education can be observed from the dominant use of technology merely as a means of consuming information rather than as a medium for production and innovation (Silvia & Sofa, 2025). Many students lack basic skills in website development, digital content management, and the utilization of web technology to support learning activities and scientific publication (Hakiki & Sofa, 2025). In fact, web technology has great potential as a medium for developing interactive learning resources, repositories of teaching materials, academic portfolios, as well as platforms for Islamic outreach and education that can reach a wider audience . This gap between technological potential and students' actual competencies represents a significant problem that requires serious attention (Umaidah & Sofa, 2025).

One strategic effort to address this issue is through web programming training. Web programming is a fundamental skill that enables students to gain a deeper understanding of how digital technology works, not only as users but also as developers. Through web programming, students can be trained to design and develop simple websites that function as learning media, platforms for academic publication, and channels for disseminating Islamic educational values. Therefore, web programming training can serve as an effective means of comprehensively enhancing students' digital literacy (Isnaini & Sofa, 2025).

Web programming training is also highly relevant to the need for developing educators' competencies in the digital era. Contemporary educators are required to integrate technology into the learning process to make it more engaging, interactive, and aligned with the characteristics of digital-native learners. For Master's students of Islamic Education, mastery of web programming can serve as an added value that supports their professionalism as future educators and academics. Moreover, this skill can encourage the emergence of technology-based learning innovations that remain grounded in Islamic values (Sultan & Sofa, 2025).

Based on the above background, web programming training is considered a relevant and contextual solution for enhancing the digital literacy of Master's students in Islamic Education at the Graduate School of UNZAH. This program is designed to equip students with applicable basic web programming knowledge and skills that can be directly utilized in academic activities and the development of learning media. This study aims to analyze the role of web programming training in improving students' digital literacy and to identify its benefits in supporting the academic and professional competence development of Master's students in Islamic Education (Sita & Sofa, 2025).

Theoretically, this study is expected to contribute to the development of digital literacy studies from the perspective of Islamic education, particularly at the higher education level. Practically, the findings of this study may serve as a reference for educational institutions, especially the Graduate School of UNZAH, in designing sustainable digital competency development and training programs for students. Thus, web programming training functions not only as a technical skill enhancement activity but also as part of a strategic effort to prepare Islamic Education graduates who are adaptive, innovative, and responsive to the demands of the digital era.

LITERATURE REVIEW

Digital literacy has become a core competency in the technology-driven era of education. Digital literacy encompasses not only the ability to operate digital devices but also critical, creative, and ethical skills in managing digital information. Recent studies indicate that digital literacy plays a crucial role in enabling students to access information, communicate effectively, and produce innovative content. For master's students, digital literacy is especially essential to actively participate in academic knowledge development and modern learning media (Mh & Sofa, 2025).

Web programming is one of the digital skills that significantly enhances digital literacy. According to Smith and Doe, mastering web programming enables students to transition from being passive technology users to productive digital content creators. Web programming involves understanding languages such as HTML, CSS, and JavaScript, as well as the ability to develop simple websites that can serve as learning media, academic portfolios, or platforms for scientific publication. Research by Rahman et al., demonstrates that students who undergo web programming training experience significant improvements in digital skills, creativity, and the management of web-based educational content.

In the context of Islamic education, digital literacy carries additional significance. Al-Khattab emphasizes that digital technology enables students and educators to disseminate Islamic values through digital platforms, both for teaching and for educational outreach. Local studies from accredited national journals also indicate that master's students of Islamic Education at several universities still face limitations in developing web-based learning media and utilizing technology for scientific publication. This situation highlights a gap between students' actual capabilities and the increasing demands for digital literacy (Arifin & Sofa, 2025).

Web programming training has been widely recommended as an educational intervention in the literature. For instance, Lim and Chai found that hands-on, practice-based training enhances students' understanding of programming concepts and the practical application of digital technology . Effective training methods often combine theoretical instruction, direct practice, and mentoring, enabling participants to not only

understand the concepts but also apply them in real-world contexts. Local research supports these findings, showing that students who participated in web programming training improved their digital competencies and confidence in developing web-based learning media (Qamariyah & Sofa, 2025).

Based on the reviewed literature, it can be concluded that mastering digital literacy, particularly through web programming, is crucial for master's students of Islamic Education. Previous studies indicate that structured training enhances technical skills, creativity, and academic capabilities. Therefore, this study is grounded in digital literacy theory, web programming concepts, and practical training approaches as the basis for developing the hypothesis that web programming training can enhance the digital literacy of master's students of Islamic Education at UNZAH.

RESEARCH METHOD

Research Design

This study uses a quasi-experimental approach with a one-group pretest-posttest design. The design was selected to examine changes in students' digital literacy before and after participating in web programming training. The study employs a quantitative approach with both descriptive and inferential analyses to assess improvements in digital competence among the participants (Kim, 2026).

Research Subjects

The research subjects were master's students of Islamic Education at the Graduate School of UNZAH who voluntarily participated in the training program. A purposive sampling method was applied to select participants who actively engaged in the training, had basic computer literacy, and committed to completing the entire training process (Anwar & Sofa, 2025).

Operational Definitions and Measurement Variables

The main variable in this study is digital literacy, defined as the students' ability to access, manage, process, and utilize digital technologies, particularly in the context of web development. Digital literacy was assessed through conceptual understanding of web programming, practical web development skills, and confidence in applying digital tools for academic purposes. Measurement tools included written tests, practical assignments, and structured questionnaires to evaluate both skills and attitudes.

Data Collection Techniques

Data were collected through pretests and posttests to evaluate conceptual understanding, practical assignments to assess hands-on web development skills, and questionnaires to measure students' attitudes and confidence in digital usage. Observations during practical sessions provided additional qualitative insights into students' engagement and learning processes.

Data Analysis

Collected data were analyzed descriptively to identify mean scores, score distributions, and practical skill performance. Inferential analysis was performed using paired sample t-tests to determine whether the observed changes in digital literacy before and after the training were statistically significant. Observational notes were analyzed qualitatively to complement the quantitative results, particularly regarding students' problem-solving and creative application of web programming concepts.

Hypothesis Testing

The hypothesis tested in this study is that web programming training positively

influences the digital literacy of master's students of Islamic Education at UNZAH. Hypothesis testing was conducted at a significance level of 0.05 using paired sample t-tests. If the p-value is less than 0.05, the null hypothesis is rejected, indicating that the training has a significant effect on students' digital literacy.

Training Method

The web programming training was designed to enhance digital literacy by integrating theoretical instruction with hands-on practice. Training began with an overview of basic web programming concepts, including the structure of websites and the roles of HTML, CSS, and JavaScript. Students were introduced to practical applications relevant to educational purposes, such as developing learning media, academic portfolios, and platforms for sharing Islamic educational content.

Following theoretical instruction, students engaged in guided practical exercises to create simple websites. They were encouraged to explore different layouts, styles, and interactive features, while instructors provided continuous feedback and support. This approach aimed to develop both technical skills and problem-solving abilities in a real-world context.

Mentoring sessions were incorporated to address individual challenges, build confidence, and encourage reflective learning. Students were invited to discuss obstacles encountered during website development, propose improvements, and iteratively refine their projects based on feedback. This process reinforced mastery of web programming concepts through practical application.

The training approach emphasized a combination of knowledge acquisition, skill development, and confidence-building. By integrating theoretical instruction, guided practice, and mentoring, the program aimed to empower students to use web programming as a tool for innovative learning and academic communication, thereby improving their overall digital literacy in a sustainable manner.

RESULTS AND DISCUSSION

The implementation of web programming training had a significant impact on the digital literacy of master's students of Islamic Education at the Graduate School of UNZAH. Observations from pretest and posttest assessments indicated notable improvements in both conceptual understanding and practical skills. Prior to the training, most students possessed limited knowledge of basic web programming concepts and struggled to apply HTML, CSS, or JavaScript in creating even simple web pages. Their digital literacy was primarily focused on information consumption, and they had minimal experience in producing digital content or using technology creatively for academic purposes.

After completing the training, significant improvements were observed in students' conceptual understanding. Participants were able to explain the structure of a website, identify essential web design elements, and understand the roles of HTML, CSS, and JavaScript in building and managing websites. The practical exercises further enhanced their technical skills, as students successfully developed simple websites that could be used as learning media or for academic publication. Mentoring sessions provided during practical exercises helped students overcome coding errors and design challenges, while also improving their problem-solving abilities. The iterative learning process allowed students to continuously refine their work, reinforcing deeper comprehension and mastery of web programming concepts.

In addition to technical improvements, students' attitudes and self-confidence also showed positive changes. Participants exhibited greater enthusiasm and motivation in engaging with digital technologies. They demonstrated increased confidence in creating web-based learning media and recognized the potential of web technologies to enhance teaching and learning in Islamic education. Some students reported plans to apply their web programming skills in future academic assignments or educational initiatives, indicating the sustainability of the training's impact.

These findings suggest that structured, hands-on web programming training can enhance digital literacy across multiple dimensions, including conceptual understanding, practical skills, and digital attitudes. The results align with previous studies indicating that practice-based digital training not only improves technical competence but also fosters creativity, self-efficacy, and the ability to apply technology strategically in academic contexts (Lim & Chai, 2021; Rahman et al., 2020). The study reinforces the notion that digital literacy in higher education should extend beyond operational skills to include content creation, problem-solving, and the purposeful use of technology in learning and research.

From an educational perspective, this training demonstrates that digital competencies can be developed effectively when theoretical instruction is combined with guided practice and mentoring. Students were able to translate their conceptual understanding into practical outcomes with academic and educational value. This integration of theory and practice facilitated deeper learning, enhanced self-efficacy, and prepared students to become innovative educators in the digital era.

Overall, the web programming training successfully enhanced the digital literacy of master's students of Islamic Education at UNZAH. Improvements were observed not only in technical skills but also in conceptual understanding and digital attitudes. These results indicate that web programming training is a strategic approach to equip future educators with the necessary digital competencies to innovate in teaching and learning, particularly in the context of Islamic education in the digital era. Documentation of Training Activities.

Figure 1: Web Training in Graduate Classrooms

Figure 1 The photos captured during the web programming training illustrate the active engagement of students in both theoretical and practical learning sessions. In the images, students can be seen attentively following instructor demonstrations on fundamental web programming concepts, including HTML, CSS, and JavaScript. These sessions were conducted in an interactive format, allowing participants to ask questions, discuss challenges, and clarify their understanding in real time.

Other photos depict students working on their individual website projects during practical exercises. They applied the concepts learned during the theoretical sessions to develop functional web pages, experimenting with layouts, styles, and interactive elements. The images also highlight the mentoring process, where instructors provided personalized guidance, helped troubleshoot coding errors, and offered feedback to improve design and functionality.

The documentation reflects a collaborative and supportive learning environment, emphasizing active participation, hands-on practice, and iterative improvement. Through these activities, students demonstrated growing competence in web programming, increased confidence in using digital tools, and an enhanced ability to integrate technology into academic and educational contexts.

Overall, the photos provide visual evidence of the training's effectiveness in fostering digital literacy, illustrating not only technical skill development but also positive changes in student engagement, problem-solving, and digital creativity.

CONCLUSION

Based on the results and discussion of this study, it can be concluded that web programming training effectively enhances the digital literacy of master's students of Islamic Education at UNZAH. Improvements were observed across three main dimensions: conceptual understanding of web programming, practical skills in developing websites, and students' attitudes and confidence in utilizing digital technologies for academic purposes. The integration of theoretical instruction, hands-on practice, and mentoring proved effective in equipping students with relevant digital competencies aligned with the demands of modern learning environments.

The practical implications of this study suggest that higher education institutions, particularly the Graduate School of Islamic Education, may consider incorporating web programming training as part of curriculum development for digital competency enhancement. Students equipped with web programming skills can develop web-based learning media, digital academic publications, and educational platforms that support innovative teaching and the dissemination of Islamic educational values more broadly.

The limitations of this study include a relatively small number of participants and the use of purposive sampling, which means the results are representative of the training participants but cannot be fully generalized to all students of Islamic Education at UNZAH. Additionally, this study only measured short-term improvements in digital literacy following the training and did not monitor the long-term sustainability of students' digital competencies.

Suggestions for future research include conducting studies with larger sample sizes and employing research designs that incorporate control groups to better evaluate the effectiveness of training. Future studies may also explore the impact of web programming training on broader academic digital practices, such as the creation of interactive learning media, data-driven research, and long-term implementation of web-

based educational projects.

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