

Enhancing Digital Literacy and Religious Moderation through an E-Book on Madrasah Principal Leadership in Islamic Boarding School Culture

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Abstract:

This study aims to assess the effectiveness of e-book development as a concrete effort to support the vision of intellectually and spiritually superior madrasah education. The method used was a quasi-experimental design with data collection techniques including interviews, observations, and questionnaires. Qualitative data were analysed descriptively, while quantitative data were analysed using paired t-tests on pretest and posttest results. The findings show that the e-book on madrasah principal leadership grounded in Islamic boarding school culture is efficacious in improving students' digital literacy. This is indicated by the t-test result ($0.014 < 0.05$), which shows a significant difference between pretest and posttest scores, and by an N-gain score of 2.795 (279.52%), which falls into the high and highly effective category. The e-book was found to be less effective in improving students' religious moderation. Although the t-test result ($0.000 < 0.05$) indicates a significant difference, the N-gain score was only 0.482 (48.2%), which is considered moderate and interpreted as less effective according to the effectiveness Table. Therefore, while the e-book has proven more effective at enhancing students' digital literacy, it still requires further development to instil values of religious moderation effectively.

Keywords: *E-book, Madrasah Principal Leadership, Digital Literacy, Religious Moderation*

Abstrak:

Penelitian ini bertujuan untuk mengkaji efektivitas pengembangan e-book sebagai upaya konkret untuk mendukung visi pendidikan madrasah yang unggul secara intelektual dan spiritual. Metode yang digunakan adalah desain kuasi-eksperimental dengan teknik pengumpulan data termasuk wawancara, observasi, dan kuesioner. Data kualitatif dianalisis secara deskriptif, sedangkan data kuantitatif dianalisis menggunakan uji-t berpasangan pada hasil pretest dan posttest. Temuan menunjukkan bahwa e-book tentang kepemimpinan kepala madrasah berbasis budaya pesantren berkhasiat dalam meningkatkan literasi digital siswa. Hal ini ditunjukkan oleh hasil uji-t sebesar $0,014 < 0,05$, yang menunjukkan perbedaan yang signifikan antara skor pretest dan posttest, dan skor N-gain sebesar 2,795 (279,52%), yang termasuk dalam kategori tinggi dan sangat efektif. Buku elektronik ini terbukti kurang efektif dalam meningkatkan moderasi beragama siswa. Meskipun hasil uji-t $0,000 < 0,05$ menunjukkan perbedaan yang signifikan, skor N-gain hanya 0,482 atau 48,2%, yang dianggap sedang dan diinterpretasikan kurang efektif berdasarkan tabel efektivitas. Oleh karena itu, meskipun

buku elektronik ini terbukti lebih berhasil dalam meningkatkan literasi digital siswa, buku ini masih memerlukan pengembangan lebih lanjut agar efektif dalam menanamkan nilai-nilai moderasi beragama.

Kata Kunci: *E-book, Manajemen Kepemimpinan Madrasah, Literasi Digital, Moderasi Beragama*

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INTRODUCTION

The development of information and communication technology has brought significant changes to the world of education, including the learning system in Islamic schools (madrasah). One important transformation is the integration of digital media, such as e-books, as interactive and adaptive learning resources to meet current needs (Mahsusni et al., 2024; Nasir et al., 2024; Shi & Liu, 2024). In the context of Islamic high schools (*madrasah aliyah*), the main challenge is how to develop a generation that is not only digitally literate but also moderate in its religious beliefs, especially amid the rapid flow of information and growing ideological polarisation in the digital space.

Madrasah principals play a strategic role in fostering an inclusive and moderate learning culture through adaptive, context-specific leadership. The principal's exemplary conduct, grounded in Islamic boarding school cultural values, such as moderation (*tawazun*), balance (*tawazun*), and tolerance (*tasamuh*), is crucial in instilling religious moderation in students (Ansori et al., 2024; Ataman et al., 2024; Yusuf, 2022). These values align with the vision of Islamic education as *rahmatan lil alamin* (blessing for the universe). They can be internalised more effectively through a digital approach that resonates with today's youth (Abiddin et al., 2024; Ahyani & Slamet, 2021). Furthermore, integrating leadership principles from Islamic boarding schools into digital learning resources could be an innovative way to combine traditional values with modern educational practices.

The development of an e-book on madrasah principal leadership based on Islamic boarding school culture is a strategic innovation expected to bridge the gap between traditional Islamic boarding school values and the demands of today's digital literacy. This e-book serves not only as reading material but also as a medium for internalising values, encouraging students to think critically and reflectively, and developing a tolerant and moderate attitude in religious life (Michaelsen et al., 2023; Wahab, 2024). The digital literacy boost offered by the e-book is accompanied by the indirect integration of Islamic cultural values, which enhances both digital and spiritual growth in students.

Previous research by Hasnadi (2023) found that developing e-books featuring local characters can increase student motivation and engagement in the learning process. E-books designed with a contextual approach not only enrich teaching materials but also help students understand the cultural and social values inherent in their lives (Hojeij et al., 2021; Michaelsen et al., 2023). These research findings are relevant to the development of e-books on Islamic boarding

school culture-based leadership, in which Islamic boarding school values such as discipline, sincerity, and togetherness can be instilled more effectively through interactive, engaging digital media. Furthermore, the availability of e-books enables greater learning flexibility and broader access for Islamic boarding school students across various regions.

The role of madrasah principals in internalising the value of religious moderation through curriculum-based programs and school culture (Noer, 2023; Prilianti et al., 2022; Siregar et al., 2023). Madrasah principals who demonstrated transformative leadership grounded in Islamic boarding school values were more successful in creating inclusive and tolerant learning environments (Mulyadi & Sobri, 2024; Norman et al., 2022). This study fills this gap by developing an e-book on madrasah principal leadership that incorporates Islamic boarding school cultural values to foster a balanced, moderate approach to religious education. The novelty of this research lies in its attempt to combine the digital transformation of education with the internalisation of Islamic values through a modern educational tool.

The primary objective of this research is to examine the effectiveness of an e-book on madrasah principal leadership, grounded in Islamic boarding school culture, in promoting both digital literacy and religious moderation at Madrasah Aliyah Banat Kudus, Central Java. This research will evaluate the impact of e-books on students' understanding of leadership principles rooted in Islamic values, as well as their ability to foster a moderate and inclusive religious mindset. The hypothesis is that developing a digital resource aligned with Islamic values will improve students' digital literacy and their ability to internalise principles of moderation and tolerance.

This research is original in its approach to combining digital literacy with religious moderation within the framework of madrasah education. While there is existing research on the use of e-books and digital media in education, this study specifically targets the unique needs of Islamic schools. It focuses on the leadership role of madrasah principals in shaping students' religious attitudes. The integration of Islamic boarding school culture into the development of an e-book offers a new perspective on how traditional values can be preserved and promoted through modern educational tools. The purpose of this research is to demonstrate that digital media, when appropriately designed, can serve as a powerful vehicle for internalising values and promoting a balanced approach to religious education in the digital age. By focusing on the leadership of madrasah principals, this study highlights the importance of role models in guiding students towards a tolerant, moderate, and inclusive understanding of religion.

RESEARCH METHOD

This study employed a quasi-experimental design to test the effectiveness of developing an e-book on Islamic boarding school leadership, grounded in Islamic boarding school culture, in enhancing digital literacy and religious moderation among Islamic high school students. The research design used was a "one-group pretest-posttest design," in which one group of subjects received a

pretest before treatment (e-book use) and a posttest after the treatment was administered (Duckett, 2021).

The population in this study consisted of 12th-grade students at Madrasah Aliyah Banat Kudus, Central Java, and a purposive sample of 45 students was selected. The instruments used included a digital literacy test and a religious moderation questionnaire, developed based on indicators from the Indonesian Ministry of Religious Affairs (2021). The validity and reliability of the instruments were tested prior to use through a limited trial.

The research procedure began with a pretest to measure students' initial digital literacy skills and understanding of religious moderation. Next, students participated in learning activities using an e-book developed based on the madrasah principal's leadership values and Islamic boarding school culture for four weeks. After the treatment, students were given a posttest to assess changes in their scores. Meanwhile, qualitative data from observations and interviews were used to support the quantitative results and to describe students' responses to e-book use in the learning process (Leko et al., 2021).

Quantitative data from the pretest and posttest were analysed using a paired t-test (Mulisa, 2022). The paired t-test was conducted to determine the effect of the Development of the Islamic Boarding School Culture-Based Madrasah Principal Leadership e-book on digital literacy and religious moderation. Furthermore, the calculation formula used Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root using the SPSS program. The testing criteria at the 5% significance level are: if the p-value is > 0.05 , then H_0 is accepted and H_1 is rejected. Conversely, if the significance value is < 0.05 , then H_0 is rejected and H_1 is accepted. As for the hypothesis test:

1. H_01 : There is no difference in the influence of the Development of the Islamic Boarding School Culture-Based Madrasah Principal Leadership e-book on students' digital literacy.
2. H_02 : There is no difference in the influence of the Development of the e-book on Madrasah Principal Leadership Based on Islamic Boarding School Culture on students' religious moderation.
3. HA_1 : There is a difference in the influence of the Development of the e-book on Madrasah Principal Leadership Based on Islamic Boarding School Culture on students' digital literacy.
4. HA_2 : There is a difference in the influence of the Development of the e-book on Madrasah Principal Leadership Based on Islamic Boarding School Culture on students' religious moderation.

RESULT AND DISCUSSION

Statistics on Measuring the Effectiveness of Madrasah Leadership E-Book

Students received treatment through practising an e-book on Islamic boarding school cultural leadership. To determine the increase in students' digital literacy, a normalised gain test (Normalised Gain) can be used, based on the initial and final digital literacy questionnaire scores. The analysis of students' digital literacy N-gain data is presented in Table 3, and statistical data on differences in students' digital literacy through the Islamic boarding school

cultural leadership e-book are in Table 1.

Tabel 1. Statistical Data on Differences in Students' Digital Literacy Through the Islamic Boarding School Cultural Leadership E-Book

T-test Student Digital Literacy				
Paired Samples Statistics				
	Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pre-test	128.4444	45	11.93268
	Post-test	133.5111	45	12.05409
Paired Samples Correlations				
		N	Correlation	Sig.
Pair 1	Pre-test & Post-test	45	.393	.008

Paired-samples statistics show that the mean for 45 students on the pretest was 128.44, and on the posttest, 133.51. The standard deviations for the pretest and posttest were 11.93 and 12.05, respectively. The standard errors of the means were 1.77 and 1.79 for the pretest and posttest, respectively. This indicates that the pretest score was lower than the posttest score, as reflected in both the mean and the standard deviation. Therefore, descriptive statistics indicate a significant positive difference in students' digital literacy levels, as evidenced by the Islamic boarding school cultural leadership e-book.

Table 2. Descriptive Statistics

Paired Samples Test						
Paired Differences				t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		
				Lower	Upper	
Pair 1	Pre-test -	-	13.21913	1.97059	-	-
	Post-test	5.06667		9.03813	1.09520	2.571

Paired differences show mean = 5.06; std. Deviations = 13.21; std. error = 1.97; 95% Confidence interval of difference lower = -9.03 and upper = -1.09; t = -2.57 with df = 44. The hypothesis test (t-test) in the Table above indicates that the significance value for the intensity inventory variable is 0.014, which is less than 0.05. This indicates a significant difference between the pretest and posttest data of students' digital literacy.

Table 3. Statistic N-gain digital literacy

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Ngain_score	44	-15.50	1.00	-.3944	2.79515
Ngain_persen	44	-1550.00	100.00	-39.4429	279.51535
Valid N (listwise)	44				

The statistical analysis in SPSS version 26 yielded an N-gain score of 2.795. According to the N-gain interpretation Table, this score falls within the high

category, as it exceeds 0.7. Meanwhile, based on the effectiveness Table, the N-gain is considered adequate because 279.52% is greater than 76. The e-book on madrasah principal leadership, grounded in Islamic boarding school culture, can effectively train students' digital literacy.

The Effectiveness of the E-Book on Islamic Boarding School Culture

The teaching and learning process at MA NU Banat Kudus was conducted offline, face-to-face, across four meetings, attended by 45 students. Students were given a treatment in the form of a practice e-book on Islamic boarding school cultural leadership. Prior to the treatment, students were given a questionnaire on religious moderation in the first meeting and another in the final meeting. To determine whether students' religious moderation improved or could be practised, a normalised gain test was used based on their initial and final scores on the religious moderation questionnaire. The N-gain analysis of students' religious moderation is presented in Table 3, and the statistical data on differences in students' religious moderation through the e-book on Islamic boarding school cultural leadership are presented in Table 4.

Table 4. Statistical Data on Differences

T-Test Religious Moderation				
Paired Samples Statistics				
		Mean	N	Std. Deviation
Pair 1	Pre-test	79.5778	45	4.69762
	Post-test	84.9778	45	4.25595

Paired-samples statistics indicate that the pretest mean for 45 students was 79.57, and the posttest mean was 84.97. The standard deviations for the pretest and posttest were 4.69 and 4.25, respectively. The standard error of the mean was 0.7 in the pretest and 0.63 in the posttest, indicating that the pretest mean was lower than the posttest mean. In contrast, the Standard deviation and standard error of the mean showed that the pretest score was greater than the posttest score. Therefore, descriptive statistics indicate a significant difference in students' religious moderation as influenced by the Islamic boarding school cultural leadership e-book.

Table 5. Descriptive Statistics

Paired Samples Correlations			
		N	Correlation
Pair 1	Pre-test & Post-test	45	.167

The results of the paired samples correlation indicate that 45 students ($df=44$) participated as respondents. The analysis revealed no significant correlation between the pretest and posttest, as the calculated r value (0.167) was smaller than the 5% significance level (0.291).

Table 6. Correlation

Paired Samples Test					
		Paired Differences	t	df	Sig. (2-tailed)
Mean	Std.	Std.	95% Confidence		

				Deviation Mean	Error		Interval of the Difference		44	.000		
					Lower	Upper						
Pair 1	Pre-test	-	-	5.78949	.86305	-	-	-				
	Post-test		5.40000			7.13936	3.66064	6.257				

Paired differences show mean = 5.4; std. Deviations = 5.78; std. error = 0.86; 95% Confidence interval of difference lower = -7.13 and upper = -3.66; t = -6.25 with df = 44. Therefore, the hypothesis testing (t-test) in the table above shows that the significance value of the intensity inventory variable is 0.000, which is smaller than 0.05, so there is a significant difference between the pretest and posttest data of Student Religious Moderation through the Islamic Boarding School Principal Leadership e-book.

Table 7. N-gain Statistics Religious moderation

	N-gain Descriptive Statistics				
	N	Minimum	Maximum	Mean	Std. Deviation
N-gain score	45	-1.00	1.00	.4635	.48219
N-gain persen	45	-100.00	100.00	46.3532	48.21937
Valid N (listwise)	45				

Statistical data processing of the SPSS version 26 program above, with N-gain score 0.482, and based on the N-gain interpretation Table, then N-gain is in the medium category because, based on the Melzer Table, it states $0.3 \leq 0.482 \geq 0.7$ (medium category). Meanwhile, based on the N-gain effectiveness Table, it can be interpreted as less effective because 48.2% is between the 40%-55% interval (less effective interpretation). This suggests that the e-book on madrasah principal leadership, grounded in Islamic boarding school culture, is less effective in training students in religious moderation.

Discussion

The first finding of this study focuses on the effectiveness of the Islamic boarding school cultural leadership e-book in improving students' digital literacy. The results of the study indicate that the e-book has been effective in enhancing students' digital literacy, aligning with previous research on the potential of digital tools in educational settings. The integration of interactive digital resources, such as e-books, into modern education is crucial, particularly in meeting the growing demands for digital literacy in the digital age (Sungkowo et al., 2024; Zhao et al., 2023). Michaelsen et al. (2023) found that e-books developed with local cultural relevance can engage students and foster an active learning environment. Both studies support the notion that digital learning tools, such as the e-book on Islamic boarding school leadership, can improve students' engagement with technology and enhance their digital skills.

The effectiveness of the Islamic boarding school cultural leadership e-book in enhancing digital literacy was further corroborated by previous research on the integration of technology in Islamic educational settings. E-books and other digital learning materials can increase student engagement and motivation when

applied correctly in religious settings (Haddade et al., 2024; Omirzak et al., 2022). Integrating technology into Islamic schools could enhance students' understanding of complex concepts, such as leadership, while also advancing their digital competencies. Leadership models grounded in Islamic boarding school culture, when conveyed through modern digital tools such as e-books, could bridge the gap between traditional values and contemporary digital learning needs (Atabik et al., 2024; Jusubaidi et al., 2024). This aligns with the current study's findings, which show that using an e-book focused on Islamic boarding school leadership effectively improved students' digital literacy.

The internalisation of religious moderation in Islamic education often requires more than just knowledge-based teaching. Religious moderation is better instilled through behaviour rather than theoretical understanding alone (Ainissyifa et al., 2024; Hilton et al., 2021). Tolerance and respect for diversity are central to religious moderation, but they are best practised rather than taught through knowledge alone. The limited inclusion of values such as tolerance, politeness, and responsiveness in the e-book may explain its moderate impact on religious moderation. While the e-book provided valuable content, it lacked sufficient practical application and behavioural exercises to foster the deeper, action-based values of religious moderation effectively.

The moderate impact of the e-book on religious moderation is consistent with findings from other educational studies. Leadership development programs often struggle to translate theoretical knowledge into practical behavioural change, particularly in the context of religious moderation (Kurniawan et al., 2022; Sabariah et al., 2023). The challenge lies not only in presenting religious principles but also in creating opportunities for students to apply these values in their daily interactions. While digital tools like e-books can introduce important concepts of moderation, more experiential learning and role modelling are necessary to achieve significant behaviour changes. These insights suggest that although the e-book succeeded in delivering content, it fell short of fostering the behavioural changes needed for long-lasting religious moderation.

The e-book developed for this study has significantly improved students' understanding of the Islamic boarding school leadership model grounded in cultural values. Dian et al. (2022) noted that leadership models presented through digital media can engage students more meaningfully. The integration of leadership principles into the e-book, such as total quality management (TQM) and tauhid-based management, not only introduced students to effective leadership strategies but also aligned these strategies with Islamic values. Islamic leadership is contextualised within the framework of Islamic boarding school culture, making the concepts more relatable and comprehensible to students. As a result, students gained a deeper understanding of leadership in the context of their own cultural and religious backgrounds.

The significant improvement in students' understanding of Islamic boarding school leadership was further supported by research that highlights the value of integrating leadership principles with cultural and religious contexts. Leadership grounded in Islamic boarding school culture, when taught through digital media, enables students to connect theoretical knowledge with practical

application (Aydemir & Türkel, 2022). The importance of providing leadership training that resonates with students' cultural and religious beliefs (Jubba et al., 2021). The e-book's emphasis on Islamic cultural leadership models, including tauhid-based management and TQM, proved effective in improving students' knowledge of leadership concepts. Aligning these principles with students' religious and cultural backgrounds further supported their learning, making the leadership content more accessible and meaningful.

This research has significant implications for the development of digital learning resources in Islamic education. The successful enhancement of digital literacy suggests that e-books can be a valuable tool for promoting modern educational skills in madrasah students. However, the e-book's moderate effectiveness in fostering religious moderation suggests that further development is needed, particularly in incorporating behavioural exercises and practical applications of moderation principles. Integrating more comprehensive discussions on religious tolerance, harmony, and peacebuilding could improve the e-book's ability to instil these values more effectively. Ultimately, this study contributes to the understanding of how digital tools can support the dual goals of enhancing digital literacy and fostering religious moderation in Islamic educational settings, paving the way for future innovations in this field.

CONCLUSION

The development of the e-book on madrasah principal leadership based on Islamic boarding school culture proved effective in enhancing students' digital literacy, as evidenced by a significant improvement in pretest and posttest scores ($t\text{-test} = 0.014 < 0.05$) and a high N-gain score of 2.795, which falls into the highly effective category. However, while the e-book demonstrated a significant difference in religious moderation ($t\text{-test} = 0.000 < 0.05$), its impact on fostering religious moderation was moderate, with an N-gain score of 0.482, categorised as less effective according to the Melzer and effectiveness tables. This suggests that while the e-book is a valuable tool for improving digital literacy, further development is needed to enhance its capacity to instil religious moderation. The limitations of this study include the lack of more in-depth behavioural exercises and the lack of real-world application of religious moderation values. Future research should focus on incorporating interactive components and experiential learning to foster tolerance and moderation better. Additionally, integrating more comprehensive leadership models and practical exercises into the e-book could further strengthen its effectiveness in promoting religious moderation alongside digital literacy.

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