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Digital Literacy and Students' Religious Moderation at MAN Lumajang: A Cross-Sectional Study

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ABSTRACT

This study estimated the association between digital literacy and religious moderation among students at MAN Lumajang. A cross-sectional quantitative survey was conducted using proportional stratified random sampling; 89 students (grade X = 35, XI = 28, XII = 26) were sampled from 778 students. Self-reported digital literacy (18 items) and religious moderation (20 items) were measured with five-point Likert-scale questionnaires and analyzed with descriptive statistics, residual diagnostics, and simple linear regression in SPSS version 29. Based on cut-offs derived from the theoretical score ranges, 60 students (67.4%) were in the moderate digital-literacy category and 54 students (60.7%) were in the high religious-moderation category. Diagnostics did not detect violations of the regression assumptions. Digital literacy was positively associated with religious moderation ($B = 0.442$, $SE = 0.093$, $t(87) = 4.73$, $p < .001$, 95% CI [0.257, 0.627]; standardized $\beta = .452$), with $R^2 = .204$ (adjusted $R^2 = .195$); that is, digital literacy accounted for about 20.4% of the sample variation in religious-moderation scores. Because the design is cross-sectional, self-reported, and bivariate, the result is an association and not evidence of a causal effect. Limitations include single-school sampling, unmeasured confounders, and social-desirability bias.

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A. INTRODUCTION

Information and communication technology has brought education into a digital era. Students are often described as “digital natives” because they have grown up with gadgets, the internet, and social media; however, familiarity with devices does not by itself establish digital competence, which also has cognitive and ethical dimensions (Calvani et al., 2009). Online platforms offer easy access to knowledge but also circulate unverified information, hate speech, hoaxes, and, in some cases, exclusive or intolerant religious content. Hatta (2019), for example, described social media as an alternative source of religious learning among senior high school students in Depok(Hatta, 2019), and Hadiyanto et al. (2025) examined how religious moderation is discussed on Instagram(Hadiyanto et al., 2025). These studies show that the quality of what students encounter online is relevant to religious attitudes; how far Indonesian madrasah students are exposed to extremist content is an empirical question that this study does not address.

Indonesia is characterized by religious, ethnic, and cultural plurality, and religious moderation has been promoted by the Ministry of Religious Affairs as a policy priority in education (Kementerian Agama RI, 2019). The Ministry describes religious moderation through four indicators: national commitment, tolerance, anti-violence, and accommodation of local culture (Kementerian Agama RI, 2019). These indicators were used as the dimensions of the religious-moderation questionnaire. Religious

moderation is distinguished here from religiosity (the intensity of religious practice), religious orientation (the motives for being religious), political conformity, and social-media ethics, which are different constructs. Madrasahs, including the State Madrasah Aliyah (MAN), are expected to foster moderate religious values while preparing students for the digital information environment (Sutrisno, 2019).

Digital literacy is more than the technical ability to operate devices; it includes searching, evaluating, understanding, and producing information critically and responsibly (Ferreira et al., 2026). General digital literacy should also be distinguished from religious digital literacy, that is, the ability to access and judge religious content online (Agusta, 2024). Conceptually, students with higher digital literacy might be better able to recognize hoaxes and provocative religious narratives, which could be linked to more moderate attitudes. This is a theoretical expectation, not an established result. Several rival explanations may also relate to religious moderation, including prior religious education, family environment, socioeconomic resources, grade level, and earlier attitudes, and a bivariate model cannot separate the independent contribution of digital literacy from these factors.

Prior studies differ in outcome, design, population, and instrument, so their findings cannot simply be treated as contradictory. The evidence that bears directly on the present question is limited: the studies reviewed here either describe the levels of two constructs without estimating their association, or estimate the association between digital literacy and a different outcome.

Agusta (2024) conducted a quantitative descriptive survey of students at MTsN 28 Jakarta, a single-case study, to describe tendencies in religious digital literacy and religious moderation.(Agusta, 2024) The article reports that religious digital literacy was in the good category and religious moderation in the very good category, and the authors conclude that religious digital literacy affects students' religious moderation. The reported results are descriptive categories; no correlation, regression, or significance test is presented, so the favorable scores on both constructs coexist in that sample but do not establish an association or effect. Its measure also concerns religious digital literacy, which is narrower than the general digital literacy examined here.

Agustina et al. (2023) surveyed 88 students at MAN 1 North Lampung with a questionnaire and interviews and analyzed the data with simple linear regression (SPSS version 25).(Agustina et al., 2023) They reported that digital literacy influenced students' social-media ethics by 42.1%, with the remaining 57.9% attributed to other factors. The article does not report the regression coefficients, test statistics, or p-values, and the 42.1% should be read as explained variation in the specified model, not as a causal percentage of students' ethics. The remaining 57.9% cannot be attributed to specific unmeasured influences without evidence; it may also reflect measurement error and model misspecification. Social-media ethics is also a different outcome from religious moderation.

Rohmadi (2025), in an undergraduate thesis on students at SMP IT Cahaya Islam, reported a significant relationship between digital literacy and social-media ethics ($p < .001$), with digital literacy explaining 30.8% of the variation.(Alfina Filanda Rohmadi, 2025) The difference between 30.8% and 42.1% arises from separate samples, instruments, and models, and does not by itself indicate contextual moderation or conflicting results.

In the sources reviewed for this article (no systematic search was conducted), we did not identify a quantitative study that estimates the association between measured

general digital literacy and religious moderation among Madrasah Aliyah students. Neighboring studies address social-media ethics, religious digital literacy, or qualitative accounts at other school levels, and this evidence is kept separate from direct evidence on religious moderation. The gap addressed here is therefore a focused, contextual one: an estimate of the association, with its uncertainty, in one Madrasah Aliyah. A new school location is a contextual extension and not, by itself, a theoretical novelty.

The study is relevant for three reasons. First, it provides an estimate of the association between digital literacy and religious moderation, with a confidence interval, in a setting where such estimates appear scarce in the sources reviewed. Second, it describes the instruments, scoring, and reliability evidence so that composite scores can be reproduced. Third, the results may inform discussion at MAN Lumajang about integrating digital literacy and religious moderation, while recognizing that an association does not show that a program would change moderation.This study used a quantitative, cross-sectional survey design. Data were collected at MAN Lumajang, Lumajang Regency, East Java, from students in grades X, XI, and XII. A one-time survey can estimate association but provides no temporal ordering, random assignment, or control of confounding; the label "associative-causal" is therefore not used.

B. METHODS

This study used a quantitative, cross-sectional survey design. Data were collected at MAN Lumajang, Lumajang Regency, East Java, from students in grades X, XI, and XII. A one-time survey can estimate association but provides no temporal ordering, random assignment, or control of confounding; the label "associative-causal" is therefore not used.

The population comprised 778 students (grade X = 306, XI = 245, XII = 227), and the sampling frame was the official class rosters. The sample size followed Slovin's formula with a 10% margin of error ($n = 778 / (1 + 778 \times 0.10^2) \approx 89$), which also gives roughly 80% power to detect a correlation of $r \approx .30$ at $\alpha = .05$ (two-sided). Within each grade, students were selected by simple random sampling using random numbers, with proportional allocation (sampling fraction $\approx$ 11.4% in each grade): grade X = 35, XI = 28, and XII = 26 students. Because the sampling fractions were equal, no weights were applied. Of 93 students invited, 89 returned complete questionnaires (response rate 95.7%); four incomplete questionnaires were excluded and no imputation was used (complete-case analysis). The 89 respondents are a sample of the 778 students, not all students.

Data were collected with two self-report questionnaires administered in class on paper. The digital-literacy questionnaire has 18 items in three dimensions based on the digital-competence model of Calvani et al. (2008): technological, cognitive (information search and evaluation), and ethical (responsible use), with six items each. The religious-moderation questionnaire has 20 items, five for each of the four indicators of the Ministry of Religious Affairs (Kementerian Agama RI, 2019): national commitment, tolerance, anti-violence, and accommodation of local culture. Both used five response options (1 = strongly disagree to 5 = strongly agree). Three digital-literacy items and four religious-moderation items were negatively worded and reverse-coded. Total scores are item sums (digital literacy 18–90; religious moderation 20–100), and higher scores indicate higher self-reported levels. Items were reviewed by experts and piloted with 30 students outside the sample; corrected

item–total correlations exceeded the critical r (.361), and Cronbach's alpha was .86 for digital literacy and .88 for religious moderation. Scores were classified as low, moderate, or high using equal intervals of the theoretical range (digital literacy: 18–41, 42–65, 66–90; religious moderation: 20–46, 47–73, 74–100).

Analyses used descriptive statistics and simple linear regression of religious moderation (Y) on digital literacy (X) in SPSS version 29. Assumptions were checked on the fitted model: linearity (scatter plot and deviation-from-linearity test), normality of standardized residuals (Shapiro–Wilk and Kolmogorov–Smirnov with Lilliefors correction), homoscedasticity (residual plot and Glejser test), independence (Durbin–Watson), and influential observations (Cook's distance). Tests were two-sided with $\alpha = .05$, and 95% confidence intervals and R^2 are reported as the effect size.

C. RESULT AND DISCUSSION

1. Digital Literacy Level of Students at MAN Lumajang

Digital literacy scores ranged from 38 to 83 (theoretical range 18–90), with a mean of 61.74 and a standard deviation of 8.31 (Table 1). Using the cut-offs described in Methods, 1 student (1.1%) was in the low category, 60 students (67.4%) in the moderate category, and 28 students (31.5%) in the high category. The observed scores cover most of the scale, so they are not confined to a narrow band. Item scoring, reverse coding, and aggregation were audited against the raw questionnaires before analysis.

The categories describe position on the instrument's own theoretical scale (equal intervals of the 18–90 range), not an external competence standard. “Moderate” therefore indicates where most students fall on this scale and should not be read as evidence that an optimal level of competence has not been reached. The data also do not show whether any school policy or program, such as internet access arrangements or the D1 ICT-equivalent program, accounts for this distribution, because none was measured.

The results are an aggregate score, so they cannot show whether technical competence is stronger than evaluative competence among these students. A pattern in which technical skills exceed evaluative skills is a hypothesis for future research that would require dimension-level analysis; it is not a finding of this study.

MAN Lumajang is an Islamic educational institution with a strong religious foundation, but this does not by itself indicate students' level of digital literacy. Digital literacy education is generally argued to need critical and ethical components in addition to technical skills.

Table 1. Summary of Descriptive Statistics of Digital Literacy at MAN Lumajang

Variables	N	Min	Max	Range	Mean	Std. Dev.	Modal category	n (%)
Digital Literacy	89	38	83	45	61.74	8.31	Moderate	60 (67.4%)

Source: *Primary research data, processed.*
Note: Scores are self-reported composite sums of 18 items (1–5); theoretical range 18–90. Cut-offs: low 18–41, moderate 42–65, high 66–90. Category frequencies: low n = 1 (1.1%), moderate n = 60 (67.4%), high n = 28 (31.5%). The n (%) column gives the number and proportion of respondents in the modal category, not an achievement score.

Digital literacy scores ranged from 38 to 83 on an 18–90 scale (M = 61.74, SD = 8.31). Most students (67.4%) were in the moderate category, 31.5% were in the high category, and one student (1.1%) was in the low category. The mean corresponds to roughly 3.43 per item on the 1–5 response scale (61.74 ÷ 18) and lies in the upper part of the moderate band, about four points below the cut-off for the high category (66). Students are therefore concentrated in the middle-to-upper region of the instrument's scale rather than at its lower end. Because the categories are equal intervals on the instrument's own scale, "moderate" describes where most students fall. It is not an external competence standard and does not imply that an optimal level has not been reached.

The most important interpretive qualification is that these scores reflect perceived, not demonstrated, digital literacy. Research that compares the two suggests that self-assessments of digital skill tend to run higher than performance. In a study of 280 junior high school students, Porat et al. (2018) found that students were highly confident in their digital literacies and significantly overestimated their actual competencies, and that only a few perceived skills were related to actual performance.(Porat et al., 2018) Calvani et al. (2012), studying Italian adolescents aged 14–16, likewise concluded that the optimistic portrayal of young people's digital competence is poorly founded.(Calvani et al., 2012) Ballantine et al. (2007) reported significant overestimation of computer competence in the self-assessments of first-year university students, and this was not changed by prior home or school computer use or formal IT education.(Ballantine et al., 2007) The evidence is not uniformly pessimistic, however. Aesaert et al. (2017) found that sixth-grade pupils' judgments of their ICT competence were relatively accurate although positively biased, and that accuracy was related to actual competence and previous ICT experience.(Aesaert et al., 2017) Taken together, the literature suggests that the moderate-to-high distribution observed at MAN Lumajang is best read as students' own appraisal of their ability. How closely it corresponds to measured performance remains an open question.

The observed range (38–83) covers most of the theoretical scale, and a sizeable high group (31.5%) sits alongside the moderate majority, which indicates real variation between students. The data cannot explain that variation. In particular, they do not show whether internet access arrangements or the D1 ICT-equivalent program contributed to the distribution, because neither was measured. Wan Ng (2012) offers a relevant general point in a study of undergraduates, self-perception measures indicated that digital literacy can be taught, and the students needed to be made aware of what counts as educational technology and given opportunities to use it for meaningful purposes.(Ng, 2012) This is consistent with the view that digital literacy is developed deliberately rather than acquired automatically. Whether such opportunities are present at MAN Lumajang is a question for subsequent research.

The aggregate score also cannot show whether technical competence is stronger than evaluative competence among these students. That pattern remains a hypothesis. It is nonetheless worth testing, because Porat et al. (2018) found that the gap between perceived and actual performance was widest for social-emotional skills, which students rated as their strongest.(Porat et al., 2018) A systematic review of Scopus-indexed studies on secondary school teachers reported that most teachers were at an intermediate level of digital literacy and called for evaluation of the frameworks used to test it.(Rahmawati et al., 2024) The population differs from the present one, so the review is not a direct benchmark. It does show that an intermediate position is commonly reported and that measurement frameworks remain under discussion.

Finally, MAN Lumajang is an Islamic educational institution with a strong religious foundation, but this alone says little about students' digital literacy. In an ethnographic study of madrasahs in Solo, Kafid et al. (2025) reported that the process of instilling a moderate religious culture had not been oriented toward interreligious and digital literacy.(Kafid et al., 2025) Their setting and method differ from those of the present study, so the finding is cited as a reason to examine, rather than assume, how digital literacy is addressed in madrasah settings.

2. The Level of Religious Moderation of Students at MAN Lumajang

Religious moderation scores ranged from 49 to 98 (theoretical range 20–100), with a mean of 76.20 and a standard deviation of 8.12 (Table 2). Using the cut-offs described in Methods, 54 students (60.7%) were in the high category, 35 students (39.3%) in the moderate category, and none in the low category. The scores cover much of the scale, which indicates variation between students rather than uniform attitudes. Because only self-reported composite scores are available, no conclusion can be drawn about differences between grades or about the effect of any school-level practice.

Religious moderation was operationalized through the four indicators of the Ministry of Religious Affairs (Kementerian Agama RI, 2019): national commitment, tolerance, anti-violence, and accommodation of local culture, with five items each (see Zaluchu et al., 2025, for a discussion of the concept). Only the total score is analyzed here. A high total score does not establish that every dimension, such as tolerance or accommodation of local culture, is uniformly high; this requires dimension-level analysis.

A high self-reported score is not equivalent to resistance to extremist narratives or to inclusive behavior; neither was measured. Responses may also be affected by social-desirability bias, particularly in a school setting where moderate answers may be perceived as expected. The results therefore describe self-reported attitudes in this sample at one point in time and are not generalized to other madrasahs or regions.

Table 2. Summary of Descriptive Statistics of Religious Moderation at MAN Lumajang

Variables	N	Min	Max	Range	Mean	Std. Dev.	Modal category	n (%)
Religious Moderation	89	49	98	49	76.20	8.12	High	54 (60.7%)

Source: Primary research data, processed.
Note: Scores are self-reported composite sums of 20 items (1–5); theoretical range 20–100. Cut-offs: low 20–46, moderate 47–73, high 74–100. Category frequencies: low n = 0 (0.0%), moderate n = 35 (39.3%), high n = 54 (60.7%). The n (%) column gives the number and proportion of respondents in the modal category, not an achievement score.

Religious moderation scores ranged from 49 to 98 on a 20–100 scale (M = 76.20, SD = 8.12). Most students (60.7%) were in the high category, 39.3% were in the moderate category, and none were in the low category. The mean corresponds to about 3.81 per item (76.20 ÷ 20) and lies roughly two points above the cut-off for the high category (74). The group as a whole therefore sits just above that threshold, and the 39.3% in the moderate category is a substantial minority. The absence of any low-category respondent indicates that, on this instrument, no student reported attitudes at the low end of the scale.

The direction of this result is consistent with other studies of Indonesian madrasah students. Using a survey at MTsN 1 Trenggalek, Fauzi (2024) reported high levels of religious moderation and tolerance among students.(Fauzi, 2023) Kafid et al. (2025) found that madrasah students in Solo understood religious moderation as taking a middle position and that a moderate religious culture had been successfully instilled.(Kafid et al., 2025) These comparisons are suggestive rather than decisive, because the studies differ in school level, region, design, and measurement.

Qualitative work also shows why the meaning of a total score needs care. Afwadzi et al. (2024) found that most of the 81 Islamic education students they studied equated religious moderation with tolerance.(Afwadzi et al., 2024) Kafid et al. (2025) reported that students understood moderation mainly in terms of social relations rather than faith (ʻaqīdah) and were not actively involved in responding to the diversity issues around them.(Kafid et al., 2025) The present instrument covers four indicators of the Ministry of Religious Affairs (national commitment, tolerance, anti-violence, and accommodation of local culture; Kementerian Agama RI, 2019), but only the total score was analysed. A high total therefore does not establish that every indicator is uniformly high, nor that students' understanding extends beyond tolerance. Dimension-level analysis is needed. Hanafi et al. (2023), drawing on interviews with lecturers and students, point to campus culture as one possible model for internalising moderation values.(Hanafi et al., 2023) Whether madrasah culture plays such a role at MAN Lumajang was not measured and cannot be inferred here.

Self-report also invites social desirability. Krumpal (2013) reviewed evidence that respondents tend to under-report socially undesirable and over-report socially desirable attitudes and behaviours because of self-presentation concerns, and that the survey situation affects the strength of this tendency.(Krumpal, 2013) In a school, where moderate answers may be perceived as expected, high scores may partly reflect what students believe is appropriate. The evidence on religious youth is mixed. Analysing nationally representative data on American adolescents, Regnerus and Uecker (2007) concluded that social desirability and embarrassment modestly reduced the reporting of some sensitive behaviours but were not associated with religiosity and did not undermine apparent religious effects.(Regnerus & Uecker, 2007) That study concerned sensitive behaviours in a different cultural setting, so it cannot be read as clearing the present data. It does caution against assuming that bias necessarily inflates scores among religious students. The findings therefore describe self-reported attitudes in this sample at one point in time. They are not evidence of resistance to extremist narratives or of inclusive behaviour, neither of which was measured, and they are not generalised to other madrasahs or regions.

3. The Association Between Digital Literacy and Students' Religious Moderation

Assumptions were checked on the fitted model. The scatter plot and the deviation-from-linearity test ($F(31, 56) = 1.09$, $p = .38$) did not indicate departure from linearity; because this test cannot prove linearity, particularly with 33 distinct predictor values, the conclusion is only that no violation was detected. Standardized residuals did not depart from normality (Shapiro–Wilk $W = .989$, $p = .668$; Kolmogorov–Smirnov with Lilliefors correction, $p = .200$). The Glejser test

showed no relationship between absolute residuals and digital literacy (p = .482), the Durbin–Watson statistic was 1.94, and the maximum Cook's distance was .078. The diagnostics therefore did not detect violations under these checks.

Simple linear regression gave the equation Y = 48.91 + 0.442X. The slope was B = 0.442 (SE = 0.093), t(87) = 4.73, p < .001, 95% CI [0.257, 0.627], with a standardized coefficient of β = .452 (equal to Pearson's r in simple regression). The model had R^2 = .204 (adjusted R^2 = .195), F(1, 87) = 22.37, p < .001, so digital literacy accounts for about 20.4% of the sample variation in religious-moderation scores. This is the proportion of variation explained by the fitted model, not the percentage of students' moderation caused by digital literacy. On average, a one-point higher digital-literacy score corresponds to a 0.442-point higher religious-moderation score; the fitted line passes through the sample means (48.91 + 0.442 × 61.74 = 76.20). Using a two-sided decision rule (reject H0 if p < .05), H0 is rejected, indicating a positive linear association in this sample. The confidence interval shows that the population slope is estimated with moderate precision, between about 0.26 and 0.63.

The descriptive pattern, with moderate digital-literacy scores and high religious-moderation scores, cannot be compared directly because the two scales and cut-offs differ. It does not show that non-digital factors predominate or that digital literacy reinforces an attitude that already exists; the variables and temporal order needed to test this were not measured. The remaining 79.6% of variation not explained by the model may reflect other factors, measurement error, or model misspecification, and no specific influence can be attributed to it. Explanations such as religious education in the madrasah, family, and school culture are hypotheses for future research that measure these variables.(Ferreira et al., 2026)

A conceptual pathway can be proposed in which digital literacy supports access to religious information, evaluative skills improve recognition of hoaxes and extreme narratives, and this in turn supports more critical and tolerant attitudes.(Setinawati et al., 2025) This pathway is untested here: the study did not measure mediators, temporal ordering, or changes in attitudes, and the questionnaire dimensions do not map one-to-one onto each step. It is therefore not an established mechanism for the observed association.

Prior studies provide context rather than confirmation. Agusta (2024) reported favorable descriptive categories for religious digital literacy and religious moderation without inferential statistics, as noted above.(Agusta, 2024) Subekti and Waslah (2024) conducted a qualitative field study at one junior secondary school in Jipurapah, Plandaan, Jombang, on digital-literacy-based education and religious moderation.(Subekti & Waslah, 2024) Qualitative evidence of this kind helps interpret context but does not confirm a numerical effect and does not extend to several schools or madrasahs.

Digital literacy is widely described as including critical access to, understanding of, and evaluation of information. Studies of religious digital literacy address religious contexts but do not test the critical-thinking pathway discussed here.(Nur, 2019) Theoretically, cognitive competencies may relate to the affective and behavioral components of attitudes (Ahmadi & Ibda, 2018); this account is distinct from the present bivariate finding, which does not test it.

The four-indicator framework of the Ministry of Religious Affairs was used to construct the questionnaire items. Using a framework to write items is

different from establishing its validity, and this study offers only pilot reliability evidence, so it does not validate the framework. Muhtarom et al. (2020) discuss the concept, values, and development strategies of religious moderation in pesantren.(Muhtarom et al., 2020) Normative recommendations that religious moderation be integrated into learning are not demonstrated by the present data.

The finding that digital literacy was mostly in the moderate category and positively associated with religious moderation suggests that a structured program on evaluating information credibility and recognizing hoaxes and hate speech could be proposed. Such a program, for example within Islamic Religious Education and extracurricular activities, is a proposal only, because this study did not evaluate any program. Because digital literacy explained about 20.4% of the variation, the findings also do not support relying on digital literacy alone; teacher role models, an inclusive school culture, and parental involvement are candidate factors that this study did not examine.

D. CONCLUSION AND SUGGESTIONS

Students' digital literacy was mostly in the moderate category (67.4%), and their self-reported religious moderation was mostly in the high category (60.7%). Digital literacy was positively associated with religious moderation ($B = 0.442$, 95% CI [0.257, 0.627], $p < .001$; $\beta = .452$).

Digital literacy accounted for 20.4% of the sample variation in religious-moderation scores ($R^2 = .204$). The remaining variation may reflect unmeasured factors, measurement error, or model misspecification and cannot be assigned to specific causes. The findings describe an association at one school and one time point and do not show that improving digital literacy will increase religious moderation. Limitations include single-school sampling, class clustering that was not modeled, self-report instruments with limited validity evidence, unmeasured confounders (prior religious education, family environment, socioeconomic resources), and common-method and social-desirability bias. Future research should use several schools, dimension-level analysis, covariate-adjusted models, and longitudinal or experimental designs.

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