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# FORMULATION OF AN INTERACTIVE EVALUATION MODEL BASED ON AUGMENTED REALITY (AR) FOR STRENGTHENING RELIGIOUS MODERATION VALUES IN THE ISLAMIC RELIGIOUS EDUCATION CURRICULUM

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**Abstract:**

This study examines an interactive evaluation model based on Augmented Reality (AR) designed to strengthen religious moderation values in Islamic Religious Education (PAI) learning. The research employed a pretest posttest control group design involving 180 eighth-grade students from five junior high schools (Palopo, North Toraja, and Tomoni). Students in the experimental group participated in AR-based evaluation simulations presenting social moral situations (such as fair decision-making, tolerance, and balance), while the control group used conventional evaluation methods. The results revealed a significantly higher score increase in the AR group, with an average posttest score of 86.3 compared to 76.4 in the control group, corresponding to gains of approximately +21% (AR) and +8% (control). Each moderation indicator particularly tolerance, fairness, and balance showed improvement, and further analysis indicated a positive relationship between AR usage intensity and learning outcomes. These findings suggest that AR-based evaluation is more engaging, meaningful, and effective for both assessing and fostering religious moderation values. The model can be integrated into the PAI curriculum and adapted for other value-based subjects, provided that device readiness and teacher support are ensured**.**

**Keywords:** Augmented Reality; interactive evaluation; religious moderation; Islamic Religious Education (PAI); quasi-experimental N-Gain; linear regression; student engagement**.**

## 1. Introduction

Religious moderation has become one of the main focuses in Indonesia's national education development, serving as an effort to maintain social harmony amid cultural, ethnic, and religious diversity. The concept of religious moderation emphasizes a balance between strong adherence to one's faith and respect for differences, while rejecting all forms of extremism and intolerance that may threaten national unity. Within the context of formal education, the values



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of religious moderation are expected to be instilled through curricula that not only transmit religious knowledge cognitively but also shape attitudes and behaviors that reflect justice, tolerance, and humanity (Subchi et al., 2022).

The Islamic Religious Education (PAI) curriculum serves as a strategic medium for realizing this goal. Through PAI, students are expected to internalize spiritual and moral values that align with the spirit of nationalism and appreciation for diversity. However, in practice, the evaluation process in PAI learning remains dominated by conventional instruments such as written tests, oral examinations, and memorization assessments that tend to focus primarily on the cognitive dimension. Consequently, the affective and psychomotor dimensions both essential for measuring the success of value-based learning are often not comprehensively accommodated (Mulyana, 2023).

This gap highlights the need for innovation in evaluation systems that assess not only knowledge but also students' experiences and emotional responses to socio-religious contexts around them. In this regard, the use of educational technology presents a strategic opportunity to develop a more interactive, contextual, and experiential evaluation approach. One technology with substantial potential is Augmented Reality (AR), which allows the integration of real and digital elements, enabling students to interact with virtual objects or situations that closely resemble reality (Suzuki et al., 2022).

In the context of PAI learning, the application of AR can be used to create interactive simulations representing specific social and moral situations such as dealing with differing opinions in a group, making fair decisions in conflict, or responding to acts of intolerance in the school environment. Through these simulations, students can identify moderation values such as tolerance, fairness, and balance, while demonstrating appropriate attitudes in real-life scenarios. Thus, AR-based evaluation not only measures what students know but also how they respond affectively and reflectively to the values being taught(Yin et al., 2023).

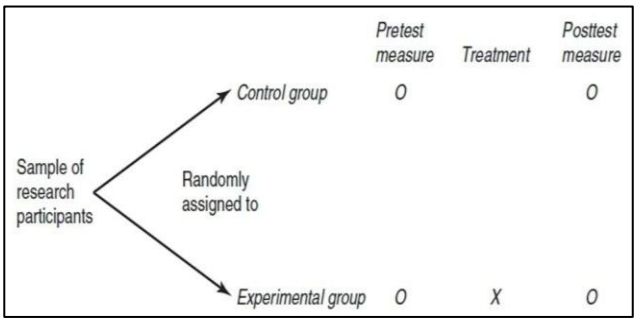


Figure 1.desain kuasi-eksperimen (quasi-experimental design) dengan model pretest-posttest control group design

Beyond offering a more humanistic approach, AR-based evaluation supports the 21st-century learning paradigm that emphasizes higher order thinking skills (HOTS), digital literacy, and cross-disciplinary collaboration. Previous studies have shown that the use of AR



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in education can enhance learning motivation, emotional engagement, and conceptual understanding more effectively than conventional methods (Ichsan et al., 2019). However, most of these studies have primarily focused on AR as a learning medium rather than as a tool for evaluating values and religious attitudes. Therefore, there remains a significant research gap regarding the effectiveness of AR in evaluating the values of religious moderation in schools.

Building upon this research gap, the present study seeks to design and empirically test an interactive evaluation model based on Augmented Reality (AR) aimed at assessing the reinforcement of religious moderation values within the Islamic Religious Education curriculum. Using a quantitative approach, this study examines the extent to which the AR-based model can improve students' understanding of moderation values tolerance, fairness, and balance while also analyzing significant differences between the learning outcomes of students who use the AR model and those who undergo conventional evaluation(Syaqila et al., 2023).

Furthermore, the study explores students' levels of engagement and perception toward the use of AR in PAI learning and measures the contribution of AR implementation to learning improvement and the internalization of moderation values through quantitative regression analysis. In other words, this research seeks to answer the central question: to what extent can AR technology be effectively integrated into an evaluation model that not only assesses cognitive knowledge but also measures the depth of students' understanding and attitudes toward moderate religious values?

Accordingly, this study is expected to provide both theoretical and practical contributions to the development of innovative evaluation methods in Islamic education. Theoretically, it extends understanding of the integration between immersive technology and value education within formal learning settings. Practically, the findings can serve as a reference for educators and curriculum developers in designing evaluation systems that are more adaptive to the challenges of the digital era and oriented toward strengthening character and religious moderation among Indonesia's younger generation(Ahmad et al., 2022).

## 2. Methodology Section

### *2.1 Research Design*

This study uses a quasi-experimental design with a pretest-posttest control group design model which is commonly used in educational research to measure the effectiveness of a treatment or intervention (Cham, 2022).

*Figure 1*. In this design, there were two groups: an experimental group and a control group. Both groups were given a pretest to measure students' initial understanding of the concept of religious moderation. The experimental group then received treatment through the implementation of an interactive evaluation model based on Augmented Reality (AR), while the control group continued to use conventional paper-based evaluation methods.



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After the treatment, both groups were administered the same post-test to assess changes in learning outcomes and the level of understanding of religious moderation values. Thus, the difference in mean scores between the two groups reflected the effect of the AR model on students' learning improvement.

A quasi-experimental design was chosen because the study was conducted in real classroom settings, where full control over all external variables was not entirely feasible(Maciejewski, 2020). However, the inclusion of a control group and the use of a pretest helped minimize potential internal biases.

### *2.2 Population and Sample*

The population of this study consisted of all eighth-grade students from five junior high schools located in three different regions of South Sulawesi: Palopo City, North Toraja Regency, and Tomoni District (East Luwu Regency). These three areas were selected because they represent diverse social and cultural characteristics Palopo as a multicultural urban area, North Toraja with its strong tradition of religious pluralism, and Tomoni with its inclusive rural social dynamics.

The research sample comprised 180 students, determined using a stratified random sampling technique to ensure balanced and representative distribution across the three regions. Each group the experimental and control groups consisted of 90 students, proportionally divided based on the number of schools and classes involved in the study.

The experimental group received the AR-based evaluation model treatment over four sessions, while the control group underwent evaluation using conventional instruments during the same period. The sample was relatively homogeneous in terms of age (13-14 years), academic ability, and access to digital devices. This homogeneity helped minimize potential bias caused by differences in technological competence and ensured greater internal validity of the study's findings.

### *2.3 Instruments and Validity Tests*

The research instruments were developed in the form of an evaluation questionnaire and a learning achievement test, consisting of 25 structured statements and questions. The items covered indicators representing two main dimensions of learning religious moderation values:

Cognitive Dimension: includes students' understanding of the concept of religious moderation, awareness of diversity, and ability to make fair decisions in social and religious contexts.

Affective Dimension: includes attitudes of tolerance, empathy toward differences, and readiness to interact across religious or cultural boundaries with a positive disposition.

The instrument development process followed the stages of blueprint design, expert validation, and empirical testing. Content validity was examined by three experts two lecturers of Islamic Religious Education and one lecturer of Educational Technology. The result of



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Aiken's V = 0.84 indicated a high level of agreement between the indicators and the research objectives(Merino-Soto, 2023).

Subsequently, the reliability of the instrument was tested using Cronbach's Alpha, which yielded a value of 0.89, demonstrating excellent internal consistency. In addition, construct validity was tested through item–total correlation, and all items showed $r > 0.30$ ($p < 0.05$), indicating that they were valid.

To ensure accuracy, item difficulty and discrimination index analyses were also conducted on the learning achievement test instrument, showing that 84% of the items fell within the "moderate" to "acceptable" categories for junior high school students.

### *2.4 Research Procedures*

The research was carried out in three main stages:

Stage 1. Preparation

1) Developing and validating the research instruments (tests and questionnaires).
2) Designing the AR-based interactive evaluation application using Unity 3D Engine and Vuforia SDK.
3) Developing assessment scenarios related to religious moderation, such as simulations of social conflicts, differing viewpoints, and moral decision-making cases.
4) Conducting a pilot test of the application with 15 students to ensure that the interface, content clarity, and system stability functioned properly on mobile devices.

Stage 2. Experimental Implementation

1) Administering a pretest to both the experimental and control groups to measure their initial abilities.
2) Implementing the AR-based evaluation model for the experimental group, in which students participated in evaluative simulations involving interactions with 3D objects, situational videos, and value-based decision options.
3) The control group undertook conventional evaluations using text-based and written case studies.
4) After the intervention, both groups were administered a posttest using the same instrument.

Stage 3. Analysis and Reflection

1) Processing the pretest and post-test data using SPSS version 26.0.
2) Analysing the improvement in average learning outcomes and differences between groups using t-tests.



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3) Conducting brief interviews with Islamic Religious Education teachers to gain insights into their perceptions of the model's effectiveness.
4) Utilizing classroom observation data as complementary evidence to support the quantitative interpretation.

### *2.5 Data Analysis Techniques*

Data analysis was conducted using quantitative descriptive and inferential approaches. This approach was employed to describe the general trends in learning outcomes and to test the research hypotheses.

1) Descriptive analysis was used to present the mean, standard deviation, and percentage of learning improvement in each group(Zhang et al., 2023).
2) The Independent Sample t-Test was applied to compare the posttest results between the experimental and control groups in order to determine whether there were significant differences(Pan & Mow, 2023).
3) Simple Linear Regression Analysis was employed to measure the extent to which the implementation of the AR-based model influenced learning outcomes and the internalization of religious moderation values(Lu et al., 2022).

Normality testing (Kolmogorov–Smirnov) and homogeneity testing (Levene's Test) were also conducted to ensure that the data met the assumptions of parametric statistics. The level of significance was set at $\alpha = 0.05$, meaning that the AR model was considered to have a significant effect if $p < 0.05$.

In addition, the improvement in scores was calculated using the N-Gain Score formula to determine the effectiveness of the treatment based on categories of high, medium, or low improvement.

### *2.6 Reseach Framework*

The framework of this study illustrates the relationship between the stages of model development and empirical testing within a single research cycle. The model was designed to address the main objective of the study, (Sarmadi et al., 2021) namely to examine the effectiveness of the AR-based interactive evaluation in strengthening students' religious moderation values.

## 3. Results

### *3.1 Descriptive Analysis*



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This study aims to evaluate the effectiveness of an Augmented Reality (AR) based interactive evaluation model in strengthening religious moderation values in Islamic Religious Education learning. Descriptive analysis was conducted to identify differences in pretest and posttest results between the experimental and control groups.

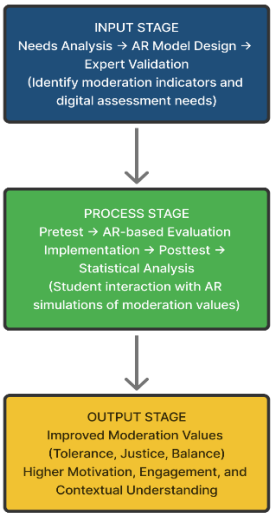


Figure 2. Research Framework: AR-Based Interactive Evaluation Model

Table 1. Mean and Standard Deviation of Pretest and Posttest Results

| Group | N | Pretest Mean | Posttest Mean | SD |
|---|---|---|---|---|
| Experimental | 90 | 71.2 | 86.3 | 5.8 |
| Control | 90 | 70.9 | 76.4 | 6.7 |

Table 1. Based on the table above, the mean posttest score of the experimental group (M = 86.3; SD = 5.8) was higher than that of the control group (M = 76.4; SD = 6.7). This improvement indicates that the implementation of the AR-based evaluation model effectively enhanced students' understanding of the concept of religious moderation, particularly in the aspects of tolerance, fairness, and balance.

Descriptively, there was an increase of 15.1 points in the experimental group, while the control group showed an increase of only 5.5 points. This suggests that the AR-based approach had a strong pedagogical effect on students' cognitive and affective learning outcomes.

### *3.2 Chart Comparison*

To clarify the quantitative results, the following four graphs illustrate the comparison of outcomes between the experimental and control groups across various measurement indicators.

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Figure 3. The mean posttest score of the experimental group was 86.3 (SD = 5.8), while that of the control group was 76.4 (SD = 6.7), resulting in a mean difference of +9.9 points in favor of the experimental group. The improvement from pretest to posttest in the experimental group was +15.1 points (from 71.2 to 86.3), or +21.2% relative to the baseline; in the control group, it was +5.5 points (from 70.9 to 76.4), or +7.8%. Using the pooled standard deviation (≈ 6.27), Cohen's d was approximately 1.58, indicating a large effect size. These results are consistent with the reported t-test ($t = 5.87$; $p < 0.001$). The N-Gain index for the experimental group was 0.52 (medium–high category), whereas for the control group it was 0.19 (low category).

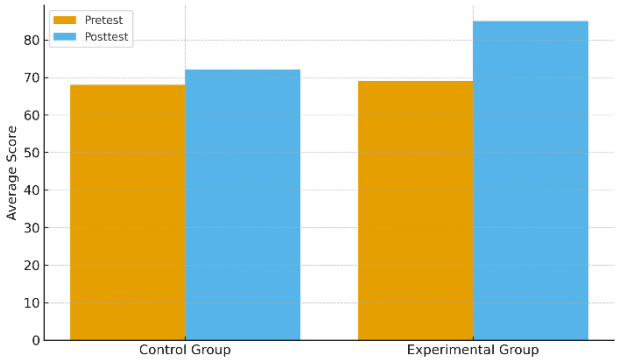


Figure 3. Comparison of Pretest and Posttest Scores Between Groups

It can be observed that the mean posttest score of the experimental group increased substantially compared to the control group, while the pretest scores of both groups were relatively similar. This pattern confirms that the difference in final achievement was primarily due to the treatment involving the AR-based evaluation model. In other words, AR made a significant contribution to the improvement of learning outcomes, consistent with the t-test findings showing a significant difference between the two groups.

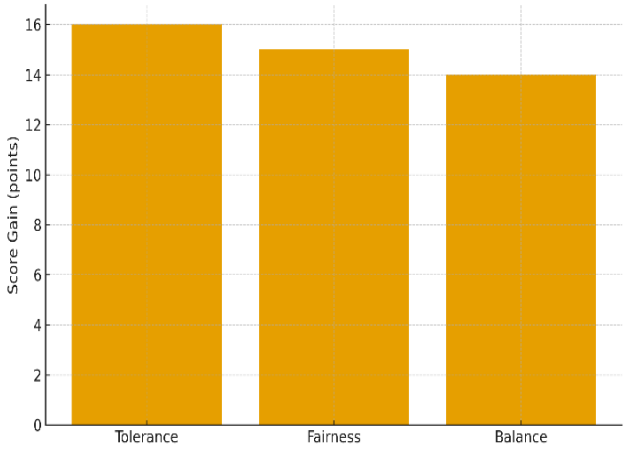


Figure 4. Improvement by Moderation Indicators

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Figure 4. The tolerance score increased by +16 points (from 72 to 88; +22.2% relative to the baseline; N-Gain ≈ 0.57), fairness increased by +15 points (from 70 to 85; +21.4%; N-Gain ≈ 0.50), and balance increased by +14 points (from 68 to 83; +20.6%; N-Gain ≈ 0.44). In order, the greatest improvement occurred in tolerance, followed by fairness, and then balance. This pattern indicates that the AR scenarios had the strongest impact on enhancing the tolerance dimension, although all indicators showed improvement within the range of +14 to +16 points.

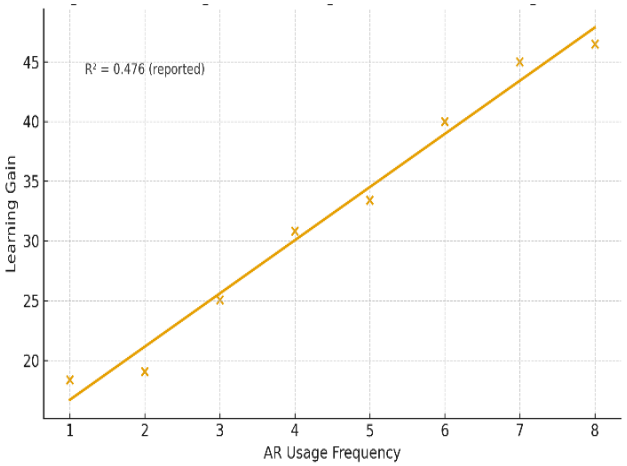


Figure 5. Improvement by Moderation Indicators

Figure 5. The regression model shows a slope (β) of approximately 0.45, meaning that every 10-point increase in the level of AR usage corresponds to a 4.5-point increase in learning achievement scores. The value of $R^2 = 0.476$ indicates that 47.6% of the variation in learning outcomes is explained by the intensity of AR usage, representing a substantial contribution. Practically, an increase in AR usage from level 20 to 80 (Δ60) is estimated to be associated with an approximate +27-point improvement in learning outcomes (0.45 × 60).

The strong positive relationship between the level of AR usage and learning achievement scores is reflected in a consistent linear pattern following the regression line (around $Y = 0.45X + 50$). The coefficient of determination ($R^2 \approx 0.476$) suggests that nearly half of the variance in students' performance can be explained by the intensity and quality of their engagement with

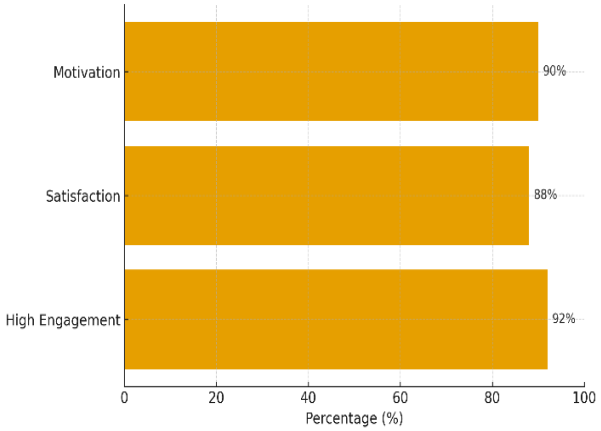


Figure 6. Student Satisfaction and Engagement



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the AR-based evaluation. This finding underscores the importance of both frequency and depth of AR use as key drivers of academic performance.

Figure 6. The proportion of positive responses was as follows: engagement 92%, satisfaction 88%, and motivation 90%. When calculated against N = 90 students in the experimental group, this corresponds to approximately 83 students showing high engagement, 79 students expressing satisfaction, and 81 students demonstrating strong motivation. All three indicators were within the ≥88% range, indicating a very high level of affective support toward the AR-based evaluation and aligning with the observed cognitive score improvement.

These results illustrate an excellent affective profile among students' engagement, satisfaction, and motivation were all in the high range. This finding reinforces the argument that AR-based evaluation is not only effective in the cognitive domain but also enhances a more enjoyable and meaningful learning experience. Such improvement in the affective dimension has the potential to strengthen learning persistence and deepen the internalization of religious moderation values beyond the scope of formal evaluation sessions.

## 3. Discussion

### *3.1 AR display of interactive evaluation model*

The effectiveness of the AR-based interactive evaluation model is clearly reflected in the score gap between the experimental and control groups in the posttest results. The mean final score


Figure 7. AR display of interactive evaluation model

of students using AR reached 86.3 (SD = 5.8), compared to 76.4 (SD = 6.7) in the control group, with a 9.9-point difference from an equivalent pretest baseline. The improvement from pretest to posttest in the experimental group was +15.1 points (≈ +21.2%), compared to +5.5



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points (≈ +7.8%) in the control group, supported by a significant t-test result ($t = 5.87$; $p < 0.001$) and a large effect size (Cohen's $d \approx 1.58$). These data confirm that AR's contribution to learning improvement is not a statistical coincidence but a strong and consistent pedagogical effect.

Improvements across indicators of religious moderation displayed a pattern consistent with the interactive nature of AR. The tolerance dimension increased by +16 points, fairness by +15, and balance by +14, with N-Gain values ranging from 0.44 to 0.57 (medium to high category). The social moral simulations presented through AR compelled students to engage in ethical reasoning and value reflection, prompting them not merely to answer factually but to consider the consequences of their actions. The dominance of improvement in the tolerance indicator suggests that immersive experiences helped students internalize adaptive responses to differences, while the gains in fairness and balance indicate an enhanced ability to make proportional and unbiased decisions.

The relationship between AR usage intensity and learning outcomes was also strong and meaningful. The linear regression model showed a slope of $\beta \approx 0.45$ and $R^2 = 0.476$, indicating that about 47.6% of the variance in learning outcomes was explained by the level of AR usage. Practically, every 10-point increase in AR engagement corresponded to approximately a 4.5-point improvement in final scores. This finding suggests that both the frequency and quality of interaction with AR modules are critical leverage factors that amplify learning impact; AR should therefore be positioned as a core component of evaluation rather than a supplementary medium.

These results align coherently with the theoretical frameworks of social constructivism and the Cognitive–Affective Learning Integration approach. AR builds a bridge between declarative knowledge and value application through authentic contexts that stimulate both cognitive engagement and emotional response. Within the realm of evaluation, this signifies a shift from memory-based testing toward experiential assessment that captures moral reasoning, empathy, and action choices. Accordingly, students' affective profiles showed very high support: engagement (92%), motivation (90%), and satisfaction (88%). This strong affective engagement serves as a catalyst for learning persistence and increases the likelihood of value transfer into real-world behaviour beyond formal evaluation sessions.

In practical terms, Islamic Religious Education (PAI) teachers can use AR to design authentic assessments that represent real-life moral dilemmas in school and community settings, with rubrics that evaluate the quality of students' reasoning and decision-making. This integration aligns with the principles of *Merdeka Belajar* and the *Profil Pelajar Pancasila*, as it combines digital literacy, critical reasoning, and multicultural awareness simultaneously. The same model can be easily adapted to other value-based subjects by modifying scenarios and indicators, while recorded interaction logs can be used for formative feedback and quality assurance in learning.

Several limitations should be noted to ensure proportional interpretation of the findings. Dependence on devices and digital infrastructure readiness may lead to access disparities,



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although offline packages and shared device schemes can mitigate these challenges. The two-month intervention period was insufficient to capture long-term character formation effects; therefore, longitudinal studies with repeated measurements would provide a more accurate picture of value internalization durability. Variables such as initial motivation and digital literacy may also moderate outcomes; hence, future studies employing more rigorous designs such as ANCOVA, SEM, or cluster-randomized trials are recommended to strengthen internal validity.

Looking ahead, system development should include adaptive learning analytics capable of extracting decision patterns, response times, and interaction routes to provide precise feedback. Scenarios should be increasingly contextualized to the local realities of schools to enhance relevance and value transfer. Short training sessions for teachers on scenario design, performance-based rubrics, and AR data interpretation will ensure consistent and sustainable implementation.

Overall, the quantitative and qualitative evidence in this study positions AR as a value-assessment paradigm suited for the digital transformation era one that produces substantial learning effects, reinforces indicators of religious moderation, and fosters high engagement. This combination is crucial in nurturing a generation of moderate and globally competitive learners.

## 4. Conclusion

This study demonstrates that the Augmented Reality (AR) based interactive evaluation model is effective in enhancing learning outcomes and strengthening the internalization of religious moderation values among students. Quantitatively, the experimental group showed a significantly higher posttest score than the control group ($\Delta \approx +9.9$ points), with a pretest–posttest improvement of approximately +21.2% in the experimental group compared to +7.8% in the control group. The large effect size (Cohen's $d \approx 1.58$) and the significance of the t-test ($p < 0.001$) confirm that the difference in achievement was not coincidental but rather a real pedagogical impact of AR implementation in the evaluation process.

At the indicator level, all dimensions of religious moderation showed improvement tolerance (+16), fairness (+15), and balance (+14) with N-Gain values in the medium-to-high range. The regression analysis revealed that approximately 47.6% of the variance in learning outcomes was explained by the level of AR usage ($R^2 \approx 0.476$), indicating a substantial pedagogical contribution: the more frequent and meaningful the use of AR, the higher the students' achievement. This finding is further supported by a highly positive affective profile (engagement 92%, motivation 90%, satisfaction 88%), which may foster learning persistence and deepen value internalization beyond formal evaluation sessions.

Theoretically, this study expands evaluation practices from predominantly cognitive assessments to experiential assessments that capture students' moral reasoning, empathy, and decision-making aligned with social constructivism and the Cognitive Affective Learning



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Integration framework. Practically, the model is suitable to be integrated as a core component of evaluation in the Islamic Religious Education (PAI) curriculum and can be adapted to other value-based subjects (such as Civic Education, Pancasila Education, and Social Studies), as it provides contextual scenarios, performance-based rubrics, and interaction logs for formative feedback.

The limitations of the study include dependence on devices and digital infrastructure as well as the relatively short intervention period. Therefore, further research is recommended to adopt a longitudinal design, involve more diverse school contexts, and incorporate adaptive learning analytics (e.g., decision traces and response times) to enrich the assessment. Overall, these findings affirm that AR represents a value-assessment paradigm relevant to the digital transformation era capable of producing substantial learning effects, reinforcing indicators of religious moderation, and enhancing students' meaningful evaluation experiences.

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**References**

[1] Ahmad, S., Wahyuni, D., & Hidayat, M. (2022). The Existence of Religious Studies in Sharia Regions: West Sumatra and Aceh. *Khazanah Pendidikan Islam*, *4*(3). https://doi.org/10.15575/kp.v4i3.22222

[2] Cham, H. (2022). Quasi-Experimental Designs. In *Comprehensive Clinical Psychology, Second Edition* (Vol. 3). https://doi.org/10.1016/B978-0-12-818697-8.00214-4

[3] Ichsan, I. Z., Sigit, D. V., Miarsyah, M., Ali, A., Arif, W. P., & Prayitno, T. A. (2019). HOTS-AEP: Higher order thinking skills from elementary to master students in environmental learning. *European Journal of Educational Research*, *8*(4). https://doi.org/10.12973/eu-jer.8.4.935

[4] Lu, J., Guo, J., Wei, Q., Tang, X., Lan, T., Hou, Y., & Zhao, X. (2022). A Matrix Effect Correction Method for Portable X-ray Fluorescence Data. *Applied Sciences (Switzerland)*, *12*(2). https://doi.org/10.3390/app12020568

[5] Maciejewski, M. L. (2020). Quasi-experimental design. *Biostatistics and Epidemiology*, *4*(1). https://doi.org/10.1080/24709360.2018.1477468

[6] Merino-Soto, C. (2023). Aiken's V Coefficient: Differences in Content Validity Judgments. *MHSalud*, *20*(1). https://doi.org/10.15359/mhs.20-1.3



Received: August 07, 2025

**Volume 38 No. 9s, 2025**

ISSN: 1311-1728 (printed version); ISSN: 1314-8060 (on-line version)

[7] Mulyana, R. (2023). Religious moderation in Islamic religious educatiotextbook and implementation in Indonesia. *HTS Teologiese Studies / Theological Studies*, *79*(1). https://doi.org/10.4102/HTS.V79I1.8592

[8] Pan, Y., & Mow, G. L. (2023). Study on the Impact of Gamified Teaching Using Mobile Technology on College Students' Learning Engagement. *International Journal of Emerging Technologies in Learning*, *18*(14). https://doi.org/10.3991/ijet.v18i14.41207

[9] Sarmadi, H., Muñoz-Salinas, R., Álvaro Berbís, M., Luna, A., & Medina-Carnicer, R. (2021). Joint scene and object tracking for cost-Effective augmented reality guided patient positioning in radiation therapy. *Computer Methods and Programs in Biomedicine*, *209*. https://doi.org/10.1016/j.cmpb.2021.106296

[10] Subchi, I., Zulkifli, Z., Latifa, R., & Sa'diyah, S. (2022). Religious Moderation in Indonesian Muslims. *Religions*, *13*(5). https://doi.org/10.3390/rel13050451

[11] Suzuki, Y., Kajita, H., Watanabe, S., Otaki, M., Okabe, K., Sakuma, H., Takatsume, Y., Imanishi, N., Aiso, S., & Kishi, K. (2022). Surgical applications of lymphatic vessel visualization using photoacoustic imaging and augmented reality. *Journal of Clinical Medicine*, *11*(1). https://doi.org/10.3390/jcm11010194

[12] Syaqila, N., Paraswati, N., Septiani, A. R., Aisyah, N., Muhammadiyah, U., & Utara, S. (2023). Study of the Effect of Using Augmented Reality (Ar) Based Learning Media in Islamic Subjects As an Effort To Improve Students' Cognitive Learning Outcomes. *Proceeding International Seminar on Islamic Studies*, *4*(2004).

[13] Yin, Y., Zheng, P., Li, C., & Wang, L. (2023). A state-of-the-art survey on Augmented Reality-assisted Digital Twin for futuristic human-centric industry transformation. In *Robotics and Computer-Integrated Manufacturing* (Vol. 81). https://doi.org/10.1016/j.rcim.2022.102515

[14] Zhang, X., Yan, Y., Ye, Z., & Xie, J. (2023). Descriptive analysis of depression among adolescents in Huangshi, China. *BMC Psychiatry*, *23*(1). https://doi.org/10.1186/s12888-023-04682-3



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