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Design of Augmented Reality Learning Media for Islamic Religious Education: Encouraging Religious Moderation in Junior High Schools

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ABSTRACT

This study aims to develop an Augmented Reality (AR)–based learning medium for Islamic Religious Education (IRE), integrating the concept of religious moderation in junior high schools. The initiative addresses the need for innovative, technology-driven educational tools that align with current pedagogical trends and religious values. The research employed a Research and Development (R&D) approach using the ADDIE model—Analysis, Design, Development, Implementation, and Evaluation. The AR learning media, named DOSIMA, was created as an Android application modeled on a modified Ludo game to deliver educational content through interactive images, videos, and web-based resources. The product was tested in three junior high schools with diverse characteristics: SMP Negeri 2 Kajen, SMP Negeri 1 Petungkriyono, and SMP NU Kesesi. Expert validation was conducted by media, content, and language specialists. Validation results confirmed the feasibility and appropriateness of the media. Field tests indicated a significant improvement in students' cognitive abilities, with average test scores increasing from 71% to 89.5%. The N-gain score of 63.125% placed the product in the "Effective" category. The findings highlight the effectiveness of AR-based tools in enhancing religious education and promoting religious moderation. This challenges the prevailing notion that Islamic education is inherently traditional or non-technological. The study underscores the potential of integrating AR in religious education and offers a foundation for policy development to foster religious moderation in secondary education settings.

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1. INTRODUCTION

Indonesia, long recognized for its cultural and religious diversity, is facing growing challenges related to religious intolerance. Despite its global image as a peaceful and pluralistic nation, recent data highlight a concerning rise in incidents of intolerance. According to Subagyo (2020), the harmony once emblematic of Indonesia has been increasingly undermined by religious conflict. In 2022, the Fund for Peace placed Indonesia 100th out of 179 countries in its Fragile States Index, categorizing it as vulnerable to internal conflict and societal division (Peace, 2023). Setara Institute's report further emphasized this trend, documenting 422 cases of religious intolerance in 2020—up from 327 cases in 2019. In 2021, 318 additional cases were recorded, spread across all provinces (Buntara, 2022). These developments threaten national unity and impede social progress, particularly within heterogeneous communities. Therefore, proactive efforts are urgently needed to cultivate a spirit of moderation and tolerance, especially within the educational sector, which plays a vital role in shaping the nation's future citizens.

Current research on religious moderation in education has largely focused on three main approaches. The first centers on critical pedagogy, aiming to raise students' awareness of the dangers of intolerance (Hidayat & Rahman, 2022). The second trend, as discussed by Nashohah (2021), addresses value education through contextual adaptation to a multicultural society. The third perspective, explored by Husna et al. (2022), links moderate religious attitudes to theological principles found in sacred texts. Additionally, Umar et al. (2021) argue that religious moderation aligns closely with the goals of character education embedded in Islamic Religious Education (IRE). Learning media, as Chamami et al. (2022) suggest, is essential in supporting the formation of students' character and should be designed to be engaging and effective.

Despite these insights, there remains a significant gap in the integration of religious moderation values into innovative learning media—particularly through the use of emerging technologies such as Augmented Reality (AR). While Islamic Religious Education aims to foster moral character and spiritual depth, it often lacks engaging tools that resonate with today's digital-native students. Integrating AR technology into IRE provides an opportunity to deliver religious moderation content in an interactive and stimulating manner, potentially increasing students' interest and comprehension.

This study seeks to address this gap by developing and evaluating an AR-based learning medium for Islamic Religious Education that emphasizes religious moderation values. Specifically, it aims to answer two research questions: (1) How can Augmented Reality be developed as a learning medium for Islamic Religious Education based on religious moderation in junior high schools? (2) How effective is this AR-based medium in enhancing students' understanding and attitudes toward religious moderation?

This research is grounded in findings that game-based learning media significantly boost student engagement and retention. Mustaqim and Ilmawan, as cited in Putri and Ramli (2016), argue that Augmented Reality has proven effective in improving conceptual understanding. Therefore, this study proposes the development of a game-inspired AR learning tool as a strategic response to both the pedagogical needs and the socio-religious challenges currently faced by Indonesia.

2. METHODS

This study employs a Research and Development (R&D) approach, which is considered the most appropriate methodology for research aimed at designing, developing, and validating educational products (Hanafi, 2017). Specifically, the goal of this research is to create a technology-integrated learning medium that supports the cultivation of moderate character values among junior high school students in Indonesia. The development process involves students from Grade VIII at SMP NU Kesesi, SMP NU Kajen, and SMP Negeri 1 Petungkriyono in Pekalongan. In addition to student participants, Grade VIII Islamic Religious Education teachers from these schools also served as informants during the needs analysis phase to ensure the relevance and practicality of the developed media.

Table 1. Teacher informants involved in needs analysis

No	Initials	Class	Research Place	Subjects
1	G1	VIII	SMP NU Kesesi	PAI
2	G2	VIII	SMP NU Kajen	PAI
3	G3	VIII	SMP N 1 Petungkriyono	PAI

Data collection techniques in this research include observation, interviews, tests, and documentation. Observations are carried out to determine the field conditions of the product being developed. Then, unstructured interviews were conducted to guide researchers in finding problems, gathering information and communicating the products being developed. Testing product effectiveness, researchers used a formative test consisting of twenty multiple-choice questions that had been validated by experts. Furthermore, the documentation method is used to obtain a broad picture of product development, both written and directly from the field. These four methods are summarized into two stages, namely the Augmented Reality-based DOSIMA learning media development stage and the assessment stage of the level of media effectiveness. The DOSIMA media development stage was carried out in the FTIK UIN K.H Abdurrahman Wahid Pekalongan microtraching laboratory. Then, an assessment of media effectiveness was carried out at NU Kesesi Middle School, NU Kajen Middle School and 1 Petungkriyono Middle School, Pekalongan.

As with development research design in general, there are various stages in developing a product. In this research, researchers used the ADDIE learning development model developed by Dicky and Carry (1996) (Ghofur & Youhanita, 2020). ADDIE development is the stages used by researchers to find new, innovative media and products that do not yet exist and have not been developed by anyone. This stage consists of 5 phases, including Analysis, Design, Development, Implementation and Evaluation (F. Hidayat & Nizar, 2021).

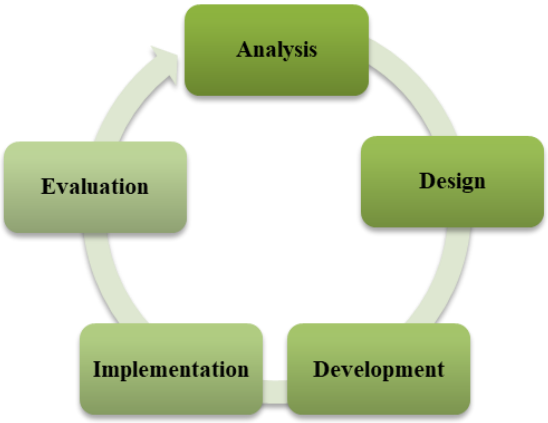

Figure 1. Stages of development of the ADDIE model.

3. FINDINGS AND DISCUSSION

The development and research process is aimed at producing a learning multimedia product in the form of a ludo game that is integrated with augmented reality technology and includes religious moderation material in it. This learning media was then given the name DOSIMA. The use of the name DOSIMA is taken from the words 'Ludo religious moderation' as a medium for learning religious moderation for class VIII junior high school students. The Dosima learning media prototype was developed in several stages, including analysis, design, design development, product implementation, and evaluation.

The analysis was carried out by conducting observations and interviews with several schools at the junior high school level in Pekalongan Regency. At this analysis stage the researcher makes observations of tasks and needs. The basic problem found at this stage was the limited learning

materials and resources in socializing religious moderation for Class VIII Middle School students (Informant G1). Informant G2 explained the importance of instilling the value of religious moderation from an early age. Meanwhile, Informant G3 shared his experience of students' low interest in studying religious moderation in Islamic Religious Education subjects. Informant G1 believes that there is a great need for educational tools that integrate the application of social life through conventional learning and smartphone technology-based learning media to align future needs. In product development trials, informants G1, G2, and G3 gave suggestions that the material taken as a sample be the theme of Believing in the Books of Allah: Becoming a Tolerant Generation of Al-Qur'an Lovers in class VIII Islamic Religious Education learning Chapter 2. Below are the core competencies and basic competencies to be achieved:

Table 2. PAI Core Competencies and Basic Competencies

Basic Competencies	Achievement Indicators
1.3 Believe in the holy books revealed by Allah SWT.	1.3.1 Believing that Allah has revealed His books to the Messengers to be conveyed to mankind
2.3 Embrace tolerant behavior as an implementation of faith in the books of Allah SWT.	1.3.2 Guide the Al-Qur'an in daily behavior
3.3 Understand the meaning of believing in the books of Allah SWT.	2.3.1 Respecting followers of other religions is one form of carrying out the commands contained in the holy book Al-Qur'an
4.3 Presenting naqli arguments regarding belief in the books of Allah SWT.	2.3.2 Do good to others regardless of their religion.
	2.3.3 Avoid disgraceful behavior towards adherents of other religions related to the beliefs they adhere to.
	3.3.1 Explain the meaning of faith in the books of Allah SWT.
	3.3.2 Mention the books and the Messenger who received them.
	4.3.1 Looking for naqli arguments regarding the existence of Allah's books other than the Koran.

The second stage is the design stage. At this stage, the researcher collects information on various kinds of learning media that can overcome the problems above. Especially in choosing learning media with the main focus on developing learning media that is fun, interactive and increases students' social feelings. Thus, a ludo game was chosen which was modified in an interesting way to be integrated with smartphones. Smartphones are used to provide more education to students and deepen the material by utilizing digital literacy sources. While collecting information, researchers communicated with teachers and lecturers in educational technology courses.

The next stage is to realize the learning media that has been designed in real life. At this stage, the aim is to produce a product which will then be validated by the validator. The product design developed has specifications in the form of an integrated learning media between the Ludo game and the development of augmented reality technology as a learning medium for Islamic Religious Education based on religious moderation. The following is a more detailed explanation of DOSIMA. DOSIMA is a learning media specifically designed to attract junior high school students' interest in studying and increasing their knowledge and insight regarding moderate religious thought. The word DOSIMA comes from the abbreviation Ludo Religious Moderation, which in its implementation integrates the ludo game in general with Augmented Reality technology to display religious moderation material in a more real form or 2D and 3D.

Apart from that, Dosima is a learning media for Islamic Religious Education that seeks to implement the development of religious moderation in PAI material in schools. As in the document on learning outcomes for Islamic Education and Character subjects issued by the Directorate General of Education at the Ministry of Religion on November 9 2021. Islamic Religious Education needs to

prioritize the growth of human resources in schools with an inclusive Islamic perspective within the framework of the Republic of Indonesia. Then, in implementing the content that must be achieved, namely aiming at the value of goodness *(al-hanifiyah*), an attitude of acceptance or openness (*alsamhah*), noble morals, and compassion for the universe (*rahmatan lil 'alamin*) (Muhtarom et al., 2021). The components needed to make Dosima include:

a. The game board consists of Ludo paper which has been modified in such a way, with a rectangular shape measuring ± 30 cm x 30 cm.
b. Pawns, are used to represent player/student moves in the game.
c. Dice, as a counter for players/students' moves, to carry out their respective pawns. Each side of the dice has a dot symbol with a number of 1 to 6.
d. Pledge of Religious Moderation, contains a pledge to always maintain harmony between religious groups and communities.
e. Question card, consisting of questions regarding religious moderation.
f. Memory cards, containing religious motivational words, for players to always remember.
g. Moderation card, containing religious moderation material to be read aloud to other friends.

Figure 2. *DOSIMA* Game Board

Stages of creating DOSIMA learning media:

a. Create a DOSIMA educational game board using the Canva application: https://www.canva.com/to design a dosima board and 4 types of cards (religious moderation cards, memory cards, question cards and moderation pledges).
b. Design a QR card with the https://www.unitear.com/ application and religious moderation material to be integrated with Augmented Reality technology. The UniteAr website is used to translate images, videos and various materials into the real world. This material is filled with religious moderation content.
c. Print dosima boards and 4 types of cards (pledge cards, religious moderation cards, memory cards, question cards).
d. Carrying out the DOSIMA Game. The following are the stages of playing the dosima game:
    1. Preparation Stage

        The game board is placed on a larger table or on the floor. Dosima cards and question cards are placed upside down in the squares provided. Players consist of 4 people. All players determine their turn first to last. Each player will get 4 pawns to represent the player's steps in the game path. Players also prepare smartphones as a means of scanning and displaying additional material from Augmented Reality.
    2. Beginning Stage

        To start the DOSIMA game, all players read the pledge of religious moderation together which will be guided by one of the players. After saying the pledge of moderation,

the players then roll the dice in turn. The player who gets a pawn of six on the dice has the right to play first and remove one of his pawns, then follow on from the start box like in the general Ludo game and walk across the track..

3. Players who stop in the question box

   Players who stop at the question box with a circle symbol and an asterisk in it, must take one question card. Then, continue with an Augmented Reality scan via the UniteAr website to find out questions about religious moderation. The cards contain questions that players must choose. Then, to find out whether the answer is right or wrong, a green or red color will appear from the Augmented Reality scan. Players who successfully answer the question will get an additional step bonus of five steps forward and players who fail will get a reduced step of five steps back.

4. Players who Quit are in the Moderation Box

   The player who stops on the box with the love symbol must take one religious moderation card to read aloud to the other players. Players who are able to read aloud to other players will remain in the box without deducting points, and players who cannot read material aloud to other players/students will have their track points deducted and move back three steps. Apart from adding insight into religious moderation, this Moderation Card can also provide more knowledge about religious moderation by scanning the unique logo on the back in the form of a video or website.

5. Players who stop at the memory box

   Players who stop at the memory box with a rectangular symbol must take a memory card to scan using augmented reality. After scanning, a display of memory questions appears which must be remembered and said out loud again when the player stops at the next rectangular symbol. Players who manage to answer correctly are allowed to roll the dice again to move forward. Players who fail to recall will be punished by going back to the same symbol on the previous track. The steps for carrying out an Augmented Reality Scan are as follows:

   1) Download the UniteAr application on the Play Store or access it via the UniteAr website
   2) Open and log in to the UniteAr Application
   3) Once ready to use, reopen the UniteAr Application
   4) Point the camera at the card you want to scan
   5) Scan the card by pressing the “Scan” button with the fingerprint logo
   6) Wait until the Augmented Reality display appears
   7) Follow the next steps according to the type of card

   The use of Augmented Reality in DOSIMA learning media provides a real form of technology-based learning adjustment, to support the millennial generation to always adapt to the increasingly rapid progress of the times. Augmented Reality in DOSIMA learning media is able to connect with various media such as YouTube, Google, Instagram, Blogs and others so on which can be used to contain relevant religious moderation content.

3.1 Field Test Results

The development of a Ludo game-based learning medium integrated with Augmented Reality (AR) to enhance knowledge and awareness of religious moderation in Islamic Religious Education (PAI) was conducted through field research and expert validation. The product, named DOSIMA, was evaluated by two expert validators. The first expert provided a validity score of 87.4%, while the second expert gave a score of 91%, resulting in an average of 89.22%, categorizing the media as valid. In comparison, media validation results showed that the first media expert assigned a score of 81.2%, and the second expert gave 79.27%, producing an average of 80.23%, which also falls within the valid

category. When combining all validator assessments, the overall average validity score was 84.72%. These results confirm that the DOSIMA learning media is considered valid and appropriate for use, with only minor revisions required for the pretest and posttest instruments.

Table 3. Results of material expert assessment

Sub Components		
	Validator 1	**Validator 2**
Material equipment	9	9
Breadth of material	9	9
Depth of material	9	9
Accuracy of evidence	8	9
Concept accuracy	8	9
Material accuracy	9	9
Total score	52	54
Sign (%)	87.4% Valid	91% Valid
Validity level		
Average score of sub-components	89.22 %	

The results of material expert analysis show that the Islamic religious education learning media integrated with augmented reality obtained a score of 87.4 for validator 1 and 91 for validator 2, so the average score obtained was 89.22. Thus, it can be concluded that the media is suitable for use as learning material without the need for revision.

Table 4. Media expert assessment results

Sub Components	Score	
	Validator 1	**Validator 2**
Appropriate color proportions	8	9
Image Selection	8	8
Design appeal	8	8
Clarity of learning instructions	9	9
Determination of implementing learning strategies	8	9
Introductory components	7	8
Ease of use	8	8
Clarity and color, images and writing	9	9
Balance of questions and answers	8	8
Clarity of problem solving evaluation	9	9
Total score	82	85
Sign (%)	81.2%	79.27%
Validity level	Valid	Quite Valid
Average score of sub components	80.23%	

The results of media expert analysis show that DOSIMA learning media received a score of 81.2 from validator 1 and 79.27 from validator 2, with an average of 80.23. Therefore, learning media can be used without revision.

The implementation stage in this research is implementing the DOSIMA learning media in the subject of Islamic Religious Education, which is carried out in three different schools, namely SMP NU Kesesi, SMP N 2 Kajen, SMP N 1 Petungkriyono with a target of class VIII in each school. Meanwhile, before implementing learning media, students were first told at the previous meeting to bring smartphones which were directed to open the UniteAr website. The implementation stage is carried out by conditioning students to form groups. Each group consists of 4 students according to the stages of the DOSIMA game.

Figure 3. DOSIMA implementation

Figure 4. Media scan with Unite AR

During the implementation of the DOSIMA learning media, students demonstrated high levels of enthusiasm, which was evident through their active participation, positive attitudes, and engaged facial expressions throughout the game-based learning process.

Following the media and content feasibility validation, the next phase involved the practical implementation of the learning media in a classroom setting. The researchers conducted a limited face-to-face trial involving Grade VIII students from SMP NU Kesesi, SMP Negeri 2 Kajen, and SMP Negeri 1 Petungkriyono. A total of 24 students participated in the trial, selected based on the topics discussed in previous lessons. The sample was deliberately structured to reflect varied cognitive abilities, with students categorized into high, medium, and low-performing groups—each comprising 8 participants.

This stratified sampling approach aimed to assess the media's effectiveness across a diverse range of learners. To evaluate the impact of DOSIMA, pretest and posttest assessments were administered, allowing the researchers to measure learning outcomes before and after media usage. The detailed breakdown of the 24 student participants is presented in the table below.

Table 5. Research Respondents

No.	Name Initials	Code	School
1.	UA	R-1	SMP N 2 Kajen
2.	IR	R-2	SMP N 2 Kajen
3.	IC	R-3	SMP N 2 Kajen
4.	BC	R-4	SMP N 2 Kajen
5.	YI	R-5	SMP N 2 Kajen
6.	AM	R-6	SMP N 2 Kajen
7.	ZM	R-7	SMP N 2 Kajen
8.	AD	R-8	SMP N 2 Kajen
9.	AA	R-9	SMP NU Kesesi
10	IR	R-10	SMP NU Kesesi
11.	ZA	R-11	SMP NU Kesesi
12.	JA	R-12	SMP NU Kesesi
13	AP	R-13	SMP NU Kesesi
14.	HI	R-14	SMP NU Kesesi
15.	MN	R-15	SMP NU Kesesi
16.	SL	R-16	SMP NU Kesesi
17.	SS	R-17	SMP N Petungkriyono
18.	AK	R-18	SMP N Petungkriyono
19.	AJ	R-19	SMP N Petungkriyono

20	SP	R-20	SMP N Petungkriyono
21.	MR	R-21	SMP N Petungkriyono
22.	RA	R-22	SMP N Petungkriyono
23.	AC	R-23	SMP N Petungkriyono
24	MM	R-24	SMP N Petungkriyono

The instruments used in the students' pretest and posttest were 20 multiple choice questions. The approach used to determine students' cognitive improvement in using DOSIMA learning media. Following are the students' pretest and posttest scores.

Table 6. Pretest and Posttest

No.	Respondents	Pretest		Posttest	
		Score	Information	Score	Information
1.	R-1	60	TL	85	L
2.	R-2	50	TL	80	L
3.	R-3	70	TL	90	L
4.	R-4	65	TL	90	L
5.	R-5	80	L	95	L
6.	R-6	85	L	95	L
7.	R-7	85	L	100	L
8.	R-8	40	TL	85	L
9.	R-9	56	TL	80	L
10.	R-10	70	TL	85	L
11.	R-11	75	TL	95	L
12.	R-12	80	L	90	L
13.	R-13	90	L	90	L
14.	R-14	85	L	95	L
15.	R-15	80	L	85	L
16.	R-16	90	L	90	L
17.	R-17	85	L	95	L
18.	R-18	80	L	90	L
19.	R-19	70	TL	85	L
20.	R-20	60	TL	90	L
21.	R-21	80	L	85	L
22.	R-22	50	TL	85	L
23.	R-23	60	TL	90	L
24.	R-24	70	TL	90	L

Score description:
L: The test results reach minimum completeness
TL: Test results do not reach the minimum completeness limit

The findings of this study indicate that the feasibility and effectiveness of the developed learning media can be determined through systematic validation and testing processes (Polyzotis, 2019). Based on the validation results, the DOSIMA learning media was deemed valid by two material experts, with scores of 87.4% and 91%, respectively. These results yielded an average validation score of 89.22% for the religious moderation teaching materials, placing them in the "valid" category. Additionally, evaluations from media experts showed that Validator 1 assigned a score of 81.2%, while Validator 2 provided a score of 79.27%, resulting in an average of 80.23%, which also falls within the valid range.

These outcomes demonstrate that DOSIMA is considered appropriate and suitable for use as a learning tool to promote religious moderation among junior high school students.

To assess the effectiveness of the DOSIMA media, the study employed pretest and posttest evaluations. These tests were designed to measure improvements in students' cognitive performance before and after using the media. Effectiveness was determined by analyzing the extent of cognitive gain, reflecting the media's role in enhancing student learning outcomes. The sample consisted of 24 Grade VIII students from junior high schools. The detailed results of the pretest and posttest scores are presented in the table below.

Table 7. Test Assessment Standards

Criteria	Score
1. Passed	y 75
2. Not Pass	< 75

Table 8. Meaning of Effectiveness Categories According to N-Gain

Percentage (%)	Interpretation
< 40%	Ineffective
40% - 55%	Effective enough
56% - 75%	Effective
>76%	Very effective

Table 9. Calculation Results of Pretest and Posttest Scores

No	Respondents	Pretest		Posttest		Percentage of N-Gain	Interpretation
		Score	Des.	Score Des	Des		
1.	R-1	60	TL	85	L	62.5%	Effective
2.	R-2	50	TL	80	L	60%	Effective
3.	R-3	70	TL	90	L	66.7%	Effective
4.	R-4	65	TL	90	L	71,4%	Effective
5.	R-5	80	L	95	L	75%	Effective
6.	R-6	85	L	95	L	66.7%	Effective
7.	R-7	85	L	100	L	100%	Very effective
8.	R-8	40	TL	85	L	75%	Effective
9.	R-9	56	TL	80	L	54.5%	Enough
10.	R-10	70	TL	85	L	50%	Enough
11.	R-11	75	L	95	L	80%	Very effective
12.	R-12	80	L	90	L	50%	Enough
13.	R-13	85	L	95	L	66.7%	Effective
14.	R-14	85	L	95	L	66.7%	Effective
15.	R-15	80	L	85	L	25%	Ineffective
16.	R-16	90	L	95	L	50%	Enough
17.	R-17	85	L	95	L	66.7%	Effective
18.	R-18	70	TL	90	L	66.7%	Effective

19.	R-19	70	TL	85	L	50%	Enough
20.	R-20	60	TL	90	L	75%	Effective
21.	R-21	80	L	85	L	25%	Ineffective
22.	R-22	50	TL	85	L	70%	Effective
23.	R-23	60	TL	90	L	75%	Effective
24	R-24	70	TL	90	L	66.7%	Effective
Total		1701		2150			**Effective**
		71		89.5		63,125%	

Table 10. Average Pretest and Posttest Results

Average Pretest Score	Average Posttest Score	N-Gain Test Results	Category
71	89.5	63.125%	Effective

3.2 Discussion

The findings of this study demonstrate that the implementation of DOSIMA, an Augmented Reality (AR)-based interactive learning medium, significantly enhanced students' cognitive abilities in understanding religious moderation. The quantitative data show a substantial increase in student learning outcomes, as reflected in the rise of average test scores from 71% to 89.5%. Further analysis using the N-gain formula revealed a gain of 63.125%, which categorizes the effectiveness of the DOSIMA learning media as "effective." This result indicates that the AR-based approach not only improves knowledge acquisition but also supports cognitive engagement and understanding.

The learning gains observed in this study can be attributed to DOSIMA's multimedia content, which integrates images, videos, and web-based materials focused on religious moderation. By combining multiple forms of content delivery, students are exposed to more immersive and diverse learning stimuli, which enhances their comprehension and retention. This is consistent with the research of Aydoğdu (2022), who found that AR-based learning significantly improves students' conceptual understanding through interactive and visual experiences. Similarly, Chang et al. (2022) conducted a meta-analysis and concluded that AR positively influences learning outcomes, particularly by increasing student engagement, motivation, and content retention. In the case of DOSIMA, these benefits were clearly demonstrated as students showed both improved performance and enthusiasm in learning activities.

Despite the overall positive results, variations in effectiveness were noted across the three participating schools: SMP Negeri 2 Kajen, SMP NU Kesesi, and SMP Negeri 1 Petungkriyono. The first two schools, located in urban settings, displayed slightly higher levels of improvement compared to the rural-based SMP Negeri 1 Petungkriyono. These differences are likely influenced by several contextual factors, including the availability of internet access, students' prior exposure to technology, and the quality of existing Islamic Religious Education (IRE) programs. Urban schools generally benefit from faster internet and greater access to digital resources, which can enhance the implementation of AR-based media like DOSIMA. Conversely, rural areas may face technological constraints, yet the adaptability of DOSIMA allows it to be modified for use in offline or conventional learning environments, making it accessible even in 3T (frontier, remote, and underdeveloped) regions.

This adaptability underlines the potential of DOSIMA as a scalable educational tool that can bridge digital divides and support inclusive education in Indonesia. The flexibility of DOSIMA also aligns with the pedagogical needs of diverse learners. Putri and Ramli (2016) reported that educational games integrated with digital technologies significantly improve student motivation and academic

performance, particularly when tailored to local learning contexts. Thus, DOSIMA's effectiveness not only lies in its technological sophistication but also in its contextual sensitivity, enabling it to serve both urban and rural educational settings effectively.

The theoretical foundation of this study is supported by the principles of Constructivism as developed by Jean Piaget and Lev Vygotsky. Constructivist learning theory emphasizes the importance of active, experiential learning where knowledge is constructed through direct interaction with content and social engagement. The AR-based features of DOSIMA align with this framework by allowing students to experience religious moderation concepts in an interactive, visual, and contextually meaningful manner. Through the use of multimedia such as videos and 3D animations, students are not passive recipients of information but active participants in their own learning process. This visual engagement promotes the formation of deeper mental representations or schemas related to tolerance, diversity, and respect.

Additionally, DOSIMA incorporates gamification elements that further reinforce constructivist principles. The game-like format encourages collaboration, discussion, and reflection—core elements of Vygotsky's social constructivist approach. As students interact with the game and its embedded content, they engage in meaningful conversations, apply learned values in simulated scenarios, and reflect on the implications of religious moderation in real life. This combination of AR and constructivist pedagogy fosters critical thinking and internalization of moral values in a way that traditional methods may not achieve.

Furthermore, DOSIMA addresses one of the key challenges in modern Islamic education: how to remain relevant and effective in the digital age. The integration of technology into IRE is not merely a matter of modernization but a strategic response to the learning preferences and behaviors of today's students. As Chamami et al. (2022) argue, learning media play a crucial role in shaping character and moral education. When these media are enhanced with digital tools like AR, they become even more powerful in facilitating transformative learning experiences. In this regard, DOSIMA emerges as a promising innovation that not only improves cognitive outcomes but also cultivates essential social and religious values through an engaging, interactive platform.

In conclusion, the results of this study confirm that DOSIMA is an effective learning medium for promoting religious moderation among junior high school students. The use of AR technology enhances student engagement, supports cognitive development, and aligns with constructivist educational principles. Despite varying levels of technological access across different regions, DOSIMA's adaptable design ensures its applicability in both urban and remote areas. Supported by empirical evidence and grounded in educational theory, DOSIMA offers a forward-thinking solution for integrating religious values with 21st-century learning technologies.

4. CONCLUSION

This study concludes that attractively designed learning media, particularly those incorporating Augmented Reality (AR), can significantly enhance students' interest and cognitive outcomes in learning religious moderation. The effectiveness of the DOSIMA media was evidenced by a substantial increase in student performance, with average pretest scores rising from 71% to a posttest average of 89.5%, placing it within the "Effective" category. Although some variations in effectiveness were observed among the participating schools, these differences were likely influenced by disparities in internet access, instructional quality, and student characteristics. Nonetheless, DOSIMA's adaptability for offline and conventional use makes it a promising tool for reaching 3T (frontier, remote, and underdeveloped) areas. However, the research has limitations, particularly in the scope of data and the analysis methods employed. The study was confined to three schools within the same region, which limits the generalizability of the findings. Additionally, the narrow sample size restricted the application of more complex analytical techniques. To address these limitations, future research should involve a broader and more diverse range of schools, participants, and geographic areas. A grounded

research approach is recommended to gather richer, contextually grounded data, enabling more accurate generalizations. The results of such expanded studies could provide valuable insights for policymakers in developing effective, inclusive, and technology-enhanced learning strategies for promoting religious moderation in educational settings.

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