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Strengthening Cultural Literacy Through Augmented Reality-Supported Civic Education Learning: A SEM-PLS Analysis

Hodriani[1]*, Halking[1], Surya Dharma[1], Mangido Nainggolan[1], Junaidi[2], Ulfa Dwi Indriani[2], Ni Kadek Suwardani[3]

[1]*Universitas Negeri Medan, Medan, Indonesia*
[2]*Universitas Pendidikan Indonesia, Bandung, Indonesia*
[3]*Necmettin Erbakan University, Konya, Turkey*

*Correspondence to: *hodriani@unimed.ac.id*

Abstract: The 21st-century education transformation needs interactive and innovative learning media that can stimulate student engagement and cultural literacy. However, Civic Education learning is still largely dominated by conventional, teacher-centered approaches, so student participation remains limited and understanding of cultural values and diversity remains difficult. The objective of this research is to analyze the influence of Augmented Reality (AR)-supported, moral dilemma-based Civic Education learning media on students' cultural literacy. This study used a quantitative research design with the Structural Equation Modeling-Partial Least Squares (SEM-PLS) approach. This study aims to determine the relationship between learning media and the development of cultural literacy. The results indicate that the AR-assisted Moral Dilemma-Based Civic Education learning media has a positive and significant effect on students' cultural literacy. Moreover, combining AR technology with moral dilemma learning contexts created an interactive, contextual, and reflective learning environment that enhanced students' engagement, critical thinking, moral reasoning, empathy, and appreciation of cultural diversity. The R-square value indicated moderate explanatory power of the model. The results show that applying AR-assisted Civic Education learning media can improve students' cultural literacy. The research contributes to enriching educational science by integrating immersive technology and values-based learning to develop cultural understanding in higher education.

Keywords: *augmented reality; civic education; moral dilemma; cultural literacy; SEM-PLS analysis*

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INTRODUCTION

The development of digital technology has brought great changes in education in the 21st century. Modern education is no longer merely about transferring knowledge but also about strengthening students' critical thinking, creativity, collaboration, communication, and literacy skills to face global challenges. The convergence of technologies like Learning Management Systems (LMS), Artificial Intelligence, virtual reality, and augmented reality has created opportunities for more engaging, personalized, and contextualized learning experiences (Rizvi et al., 2025; Steriu & Stănescu, 2023). Furthermore, the development of educational technology has led to digital innovations in learning that promote students' engagement and motivation to learn (Ghanbaripour et al., 2024). However, the digital education transformation still faces several challenges, including limited pedagogical innovation, unequal access to technology, and the predominance of traditional learning approaches that do not align with the needs of today's digital generation (Adeoye & Oni, 2024; Mateo-Guillen & Ocaña, 2025). Therefore, 21st-century education requires interactive and adaptive learning media to improve the quality of learning and students' literacy skills.

Civic Education therefore plays a strategic role in shaping students' character, moral values, and national identity. Civic Education is not merely a subject that offers an understanding of citizens' rights and responsibilities, but a values-based educational medium that inculcates democratic attitudes, tolerance, social responsibility, and respect for cultural diversity (Altaany & Abdelbary, 2024). Civic Education is important in building active, critical, and democratic citizens by reinforcing civic knowledge, civic skills, and civic dispositions (White et al., 2023). In addition, Civic Education is also closely related to the strengthening of cultural literacy because the learning materials are related to national identity, national values, and the diversity of Indonesian culture which is reflected in the national motto Bhinneka Tunggal Ika (Unity in Diversity) (Nuryadi, 2020). Therefore, Civic Education learning is an important tool in developing cultural awareness and reinforcing students' character amidst the currents of globalization. Cultural literacy is a person's ability to understand, appreciate, and implement cultural values in everyday life. Cultural literacy is very important in a multicultural society like Indonesia because it can strengthen national identity, social tolerance, and respect for diversity.

However, several challenges remain in improving cultural literacy in traditional educational environments. Students' cultural literacy development is less optimal because they have a limited understanding of local cultural values, cultural integration is lacking in the learning process, and contextual learning approaches are used minimally (Ford & Kea, 2009). Additionally, many students are not interested in Civic Education because they think it is theoretical and has no bearing on everyday life (Heafner, 2023). This situation negatively affects students' participation in the educational process and reduces their understanding of national and cultural values.

These problems are also affected by the use of conventional, teacher-centered Civic Education learning media. The learning process, characterized by lecture methods, tends to make students less active, easily bored, and less able to understand abstract material effectively, especially material related to cultural, moral, and civic values (Sia & Md Yusof, 2024). Learning media that is less visual and interactive makes it difficult for learners to comprehend cultural contexts in a real and meaningful way. In fact, 21st-century learning requires media that provide engaging, participatory, and contextual learning experiences to help students better understand the learning materials and actively participate in the learning process (Balalle, 2024). Therefore, more innovative Civic Education learning media is needed to increase students' motivation to learn and to strengthen their cultural literacy.

One technology that can be an innovative solution in education is Augmented Reality (AR). Augmented reality is a technology that combines virtual objects with the real world in real time, creating a more interactive and immersive learning experience (Curran et al., 2011). AR technology allows students to observe realistic three-dimensional object visualizations, simulations, and cultural representations on digital devices such as smartphones and tablets (Shirley et al., 2025). In traditional education, AR has been shown to increase students' engagement, motivation, and understanding of learning materials by providing more attractive and contextual learning experiences (Kapoor & Naik, 2020). Moreover, AR can help learners comprehend abstract concepts by providing more tangible visualizations and supporting experiential learning approaches (Ajao et al., 2024). The application of AR in Civic Education makes cultural materials, diversity, and national identity feel more real and enables learners to understand cultural values more deeply.

Augmented reality is also closely associated with enhancing students' cultural literacy. AR can show interactive visualizations of local culture, history, national symbols, and social values, helping students better understand Indonesia's cultural diversity in context. This technology enables students to have learning experiences that are not only theoretical but also reflective and exploratory through direct engagement with digital cultural objects (Vashisht & Sharma, 2024). In addition to increasing cultural understanding, AR can also increase students' emotional engagement in the learning process, making cultural values easier to understand and internalize (Chen & Karsen, 2025). Therefore, using AR in Civic Education learning can be a new medium for reinforcing students' cultural literacy and character development.

Previous studies suggest that augmented reality can positively impact learning. Kapoor and Naik (2020) demonstrated that AR can improve students' engagement in secondary school through interactive visualizations. According to Chen and Karsen (2025), AR improves students' motivation, collaboration, and learning experiences. Additionally, Vashisht and Sharma (2024) noted that AR in history learning enhances students' comprehension of cultural and historical contexts. Nuryadi and Widiatmaka (2023) highlighted the importance of enhancing digital proficiency and civic literacy within Civic Education in the Society 5.0 era. While the educational advantages of augmented reality have been verified in prior studies, most have focused on learning motivation, engagement, academic achievement, online literacy, or historical and cultural understanding in general educational environments. The study of cultural literacy as a specific educational outcome is rarely addressed within Civic Education learning environments. Moreover, recent studies have focused on AR as a technological tool rather than on how AR-based learning media can help students internalize the civic and cultural values that are central to Civic Education.

Another important gap relates to methodological approaches. AR implementation has mostly been explored using descriptive, experimental, or qualitative designs. However, empirical studies using SEM-PLS to model the structural relationship between AR-based Civic Education learning media and students' cultural literacy are scarce. Therefore, there is still little evidence about the extent and direction of the relationship between AR-assisted Civic Education learning and cultural literacy development. However, research that simultaneously combines Civic Education learning media, cultural literacy, and augmented reality is still relatively limited, especially empirical studies on the influence of AR use on students' cultural literacy using a quantitative SEM-PLS-based approach.

Based on the above, the novelty of this study is integrating Civic Education learning with augmented reality to increase students' cultural literacy. This study not only emphasizes the technology side of learning but also empirically examines the relationship between AR-based Civic Education learning media and the improvement of students' cultural literacy through a quantitative approach using Structural Equation Modeling-Partial Least Squares (SEM-PLS). The novelty of this study lies in the combination of the constructs of Civic Education, augmented reality, and cultural literacy. This study conceptually frames cultural literacy as a

measurable outcome of AR-based Civic Education learning and thus provides a more explicit explanation of how immersive digital learning experiences contribute to the development of civic and cultural competences. This perspective is different from previous studies that focused primarily on student engagement, motivation, or overall learning outcomes from AR use.

Empirically, this research is novel in testing the structural model of the direct effect of Augmented Reality-assisted Moral Dilemma-Based Civic Education Learning Media on students' cultural literacy using SEM-PLS. Unlike previous AR studies that mainly focused on instructional effectiveness, this study examines the role of AR-mediated moral dilemma learning in strengthening students' understanding, appreciation, and application of cultural values within the framework of Civic Education. The study's emphasis on improving culture and character through interactive learning technology is an important contribution to the development of innovative civic education in the digital era. Hence, this study aims to analyze the effect of augmented reality-based Civic Education learning media on students' cultural literacy.

METHODS

This study used a quantitative approach with an explanatory research design to analyze the causal relationship between the use of Augmented Reality-assisted Moral Dilemma-Based Civics Learning Media and students' cultural literacy. This approach was selected because it allows for the empirical assessment of the impact of independent variables on dependent variables through objective, statistically measurable techniques (Creswell & Creswell, 2017). The independent variable in this study was Moral Dilemma-Based Civics Learning Media Assisted by Augmented Reality, and the dependent variable was students' cultural literacy. The study was conducted with university students who participated in Civic Education courses that integrated moral-dilemma learning media based on augmented reality.

The augmented reality intervention was carried out through Civic Education learning activities where students were presented with AR-based scenarios involving contextual moral dilemmas on cultural values, diversity, tolerance, and citizenship issues. Through augmented reality technology, the learning activities involved students observing, analyzing, and discussing the presented moral dilemmas, thereby promoting active engagement with cultural literacy concepts.

Data were collected using a structured questionnaire with five-point Likert scales ranging from 1 (strongly disagree) to 5 (strongly agree) (Creswell & Creswell, 2017). The questionnaire was formulated based on a comprehensive review of the literature on technology-enhanced learning, pedagogy of moral dilemma, augmented reality, and cultural literacy. Content relevance and clarity of the first instrument items were checked by experts in the fields of Civic Education, educational technology, and educational measurement before administration to respondents. All research indicators were built based on theoretical studies of technology-based learning, moral dilemmas, and cultural literacy. The research indicators are shown in Table 1.

Table 1. Indicator of Research Variable

Variable	Code	Indicator
Moral Dilemma-Based Civics Learning Media Augmented Reality	MD1	Augmented reality media help students understand moral dilemmas in Civic Education learning
	MD2	Augmented reality media make Civic Education learning more interesting
	MD3	Augmented reality media facilitate students in discussing cultural values
	MD4	Augmented reality media are relevant to students' daily lives
	MD5	Augmented reality media increase students' participation in learning
Cultural Literacy	CL1	Students understand local cultural values
	CL2	Students respect cultural differences.
	CL3	Students can behave in accordance with cultural values.
	CL4	Students can relate culture to social issues.
	CL5	Students demonstrate tolerant attitudes in daily life.

The research instrument was subjected to validity and reliability tests before being used in the main study to ensure the consistency and accuracy of measuring the research constructs. Before the main survey, a pilot test was conducted. The measurement properties of the instrument were then tested through convergent validity, discriminant validity, composite reliability, and Cronbach's alpha in the SEM-PLS analysis. The sampling technique used is purposive sampling, a type of non-probability sampling. The reason for choosing this technique is that the research needs respondents with firsthand experience using Moral Dilemma-Based Civics Learning Media Assisted by Augmented Reality. The respondents were students who had taken part in Civic Education learning through the media for at least one semester. The total research sample was 180 respondents, which was considered sufficient for Structural Equation Modeling-Partial Least Squares (SEM-PLS) analysis. This approach is suitable for moderate sample sizes and predictive research models (Hair Jr et al., 2019). The respondents were undergraduate students with different academic backgrounds who underwent the same learning intervention. Therefore, all respondents had sufficient experience to evaluate the effectiveness of the AR-based learning media. Although purposive sampling limits the generalizability of the findings, it was

considered appropriate given the study's specific focus on students who had directly experienced the intervention under investigation. Ethical issues were thoroughly considered during the research process. Participation was voluntary, and respondents were informed about the purpose of the study; informed consent was obtained before data collection. The anonymity and confidentiality of participants' responses were maintained, and all data collected were used for academic research purposes only.

PLS-SEM was employed for data analysis using SmartPLS 4 software (Hair Jr et al., 2019). This technique was selected because it can evaluate both the measurement (outer) and structural (inner) models and estimate structural relationships between latent constructs simultaneously. The outer model was evaluated by convergent validity, discriminant validity, composite reliability, and Cronbach's alpha. The inner model was evaluated by analyzing the path coefficients, R-square values, effect size (f-square), and predictive relevance (Q-square). We used a bootstrapping procedure to obtain t-statistics and p-values for hypothesis testing at a 5% significance level. This method was chosen because it offers a more robust estimation of the parameters in studying the impact of Moral Dilemma-Based Civics Learning Media Assisted by Augmented Reality on students' cultural literacy.

RESULT AND DISCUSSION

This study is an extension and broader development of previous research focused on developing Moral Dilemma-Based Civics Learning Media Assisted by Augmented Reality. The learning media is developed as an Android-based application that combines the moral dilemma approach with Augmented Reality technology for learning Civic Education. This media was developed to help students better understand various moral, social, and cultural issues through interactive visualizations closely related to everyday life. The application includes scenarios of moral dilemmas that require students to think critically, reflect on values, and make responsible decisions within the framework of social and national life. The augmented reality media developed not only presents the learning materials visually and interactively but also enables students to interact with the learning objects and situations more realistically. The use of augmented reality technology in this learning media aims to increase students' interest in the learning process, make learning more engaging, and deepen students' understanding of cultural and civic values. So, the learning media is not only a medium for delivering learning material but also a medium of character building, strengthening cultural literacy, and developing students' reflective thinking skills.

The previous study discussed the product development process, expert validation, and feasibility testing of learning media for Civic Education. The results showed that the media developed had a high level of validity and feasibility at all stages of assessment. Expert validation of the material resulted in a score of 4.50, indicating that the content, learning objectives, and moral dilemma scenarios are very appropriate for Civic Education learning. The validation by media experts scored 4.45, indicating the quality of the application design, augmented reality features, and user interface. Moreover, the learning practitioner validation obtained a score of 4.40, which implies that the media is practical and feasible to use in the classroom. A small-group trial with students also supported the media's feasibility, with a score of 4.21. All assessment results in general were categorized as 'Very Good,' which indicates that the Augmented Reality-Assisted Moral Dilemma-Based Civics Learning Media was valid, feasible, and appropriate to use in Civic Education learning (Hodriani, Halking, Dharma, Nainggolan, et al., 2025b).

The results of the validation showed that the Moral Dilemma-Based Civics Learning Media Assisted by Augmented Reality was stated to be feasible to use in the learning process. The assessment results showed that the media met the criteria for media design, content feasibility, interactivity, ease of use, and relevance to Civic Education learning. Moreover, the learning media were considered able to increase students' engagement, encourage critical thinking about moral dilemmas, and strengthen cultural and civic literacy. Therefore, the developed learning media were declared ready to be tested further to assess their influence on students' cultural literacy. The research continued to investigate the effect of using the media on students' cultural literacy after the learning media were declared feasible. At this stage, the research was not only limited to the development and feasibility of the media, but rather measured empirically the extent to which the Moral Dilemma-Based Civics Learning Media Assisted by Augmented Reality contributed to improving students' cultural literacy. Thus, the present work continues to reinforce the findings of previous studies by further examining the causal relationship between the variables.

At this stage, the analysis not only statistically tested the relationship between variables but also interpreted the findings within the framework of Civic Education (learning, especially to strengthen value-based and culture-based character education. The influence analysis was carried out using the Partial Least Squares Structural Equation Modeling (PLS-SEM) approach in SmartPLS. Model testing was conducted by testing the measurement model (outer model) to assess construct validity and reliability, and the structural model (inner model) to test the relationships between the research variables. The results of the analysis were then presented systematically through construct reliability and validity testing, discriminant validity testing, path coefficient analysis, coefficient of determination analysis, and significance testing of the variable relationships. This

presentation was designed to explain the analytical process step by step, from instrument quality to the interpretation of relationships between variables within the framework of Civic Education teaching. The findings were interpreted by correlating the research results with Civic Education learning concepts based on moral dilemmas, the integration of augmented reality technology, and the development of students' cultural literacy. The validity and reliability of the research constructs were explored by assessing the measurement model. The testing process was conducted using construct reliability and convergent validity analyses, and measured using Cronbach's Alpha, rho_A, Composite Reliability, and Average Variance Extracted (AVE) values. The results of the construct reliability and convergent validity testing are shown in Table 2.

Table 2. Reliability and Convergent Validity

	Indicator	Loading Factor	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Cultural Literacy	CL1	0.936				
	CL2	0.960				
	CL3	0.954	0.972	0.972	0.978	0.898
	CL4	0.950				
	CL5	0.938				
Moral Dilemma-Based Civics Learning Media Augmented Reality	MD1	0.945				
	MD2	0.960				
	MD3	0.944	0.976	0.976	0.981	0.912
	MD4	0.960				
	MD5	0.967				

This section reports on the assessment of the measurement (outer) model and structural (inner) model. Table 2 presents the results of validity and reliability tests for the measurement model. The factor loadings for each indicator in the variables of Cultural Literacy (CL1-CL5) and the variable of Moral Dilemma-Based Civics Learning Media Assisted by Augmented Reality (MD1-MD5) ranged from 0.936 to 0.967. All indicators have very strong convergent validity and represent the latent constructs well, as the values are well above the minimum threshold of 0.70. The Average Variance Extracted (AVE) values of 0.898 and 0.912 further confirm that more than 50% of the variance in the indicators could be explained by the latent constructs. Therefore, the research instrument is considered able to measure the constructs of cultural literacy and Civic Education learning media accurately in accordance with the conceptual framework used in this study.

Furthermore, the results of the reliability test showed that the two variables' Cronbach's Alpha and rho_A were above 0.70, at 0.972 and 0.976, respectively. The Composite Reliability values were also very good, namely 0.978 and 0.981. These values indicate that the constructs have a very high level of internal consistency (excellent reliability), meaning the research instrument is reliable and internally consistent. Based on these findings, it can be concluded that all variables in this study meet the validity and reliability criteria and are suitable for the further stages of model testing. The next step was the discriminant validity test to ensure that each construct was conceptually distinct and did not overlap with other constructs. The Heterotrait–Monotrait Ratio (HTMT) approach was used to assess the discriminant validity. Table 3 shows the results of the discriminant validity testing.

Table 3. Discriminant Validity (HTMT)

	Original Sample	Sample Mean	2.5%	97.5%
Moral Dilemma-Based Civics Learning Media Augmented Reality	0.875	0.956	0.643	1.374

The HTMT value derived from Table 3 was 0.875. This value is below the 0.90 threshold, indicating that the discriminant validity between constructs is statistically acceptable. It also confirms that the Civic Education learning media variable and the cultural literacy variable are two empirically distinct constructs of the measured phenomena with no major overlap. However, the HTMT confidence interval (0.643-1.374) exceeds 1, which means that there is still some overlap between the constructs. Therefore, the interpretation of discriminant validity should be treated cautiously. Thus, the constructs of learning media and cultural literacy can be seen as two independent variables in the research model. Furthermore, the fulfillment of discriminant validity also shows that the research instrument can measure each construct specifically based on the predetermined indicators. Therefore, the analysis results can be considered to have a good degree of accuracy and reliability in explaining the relationships between the variables investigated in this study.

In addition, the structural model was analyzed to investigate the relationships between the variables in the study. The testing process was done through path coefficient analysis, coefficient of determination (R-square) analysis, and significance testing of the relationship between variables. The path coefficient was used to assess the direction and magnitude of the effect of the independent variable on the dependent variable. The

results of the path coefficient analysis showed that the path coefficient between Civics Learning Media Based on Moral Dilemma Assisted by Augmented Reality and Cultural Literacy was 0.630. This coefficient shows a strong positive relationship. This means that if the learning media variable increases, the cultural literacy variable will also increase. Specifically, a 1-unit increase in the learning media variable will increase cultural literacy by 0.630, assuming the other variables in the model are constant. A value of $\beta > 0.50$ in PLS-SEM indicates a strong influence, meaning that learning media has a significant effect on cultural literacy. These findings show that improvements in the quality and utilization of Moral Dilemma-Based Civics Learning Media Assisted by Augmented Reality tend to be followed by improvements in students' cultural literacy.

So the more effective the learning media based on moral dilemmas are, assisted by augmented reality, the greater the possibility of improving students' cultural literacy. The value of the path coefficient shows that the magnitude of the influence is high, which means that the learning media make a substantial contribution to increasing students' cultural literacy. These results suggest that using augmented reality technology in conjunction with a moral dilemma approach can help students learn about cultural values in a more contextual, interactive, and reflective manner. Furthermore, the learning media also have the potential to make learning more interesting and meaningful, encouraging students' active involvement in the learning process and strengthening their understanding of cultural diversity in society.

In addition, the coefficient of determination was used to measure the extent to which the independent variable could explain the dependent variable within the research model. The R-Square analysis results showed that the Cultural Literacy variable had an R-Square (R2) value of 0.397 and an Adjusted R-Square value of 0.393. A value of R2 of 0.397 means that the variable Moral Dilemma-Based Civics Learning Media Assisted by Augmented Reality can explain 39.7% of the variation in students' cultural literacy. This finding indicates that the learning media variable has a moderate but significant contribution in influencing the level of cultural literacy. The remaining 60.3% of the variation in cultural literacy is explained by variables outside the research model, meaning various external factors influence cultural literacy. These may include factors such as the family environment, students' social and cultural experiences, the teaching methods used by lecturers, the availability of learning resources, and the characteristics of individual students. These results, therefore, indicate that cultural literacy is a complex and multidimensional competence whose development is not solely determined by the use of learning media, but is also impacted by multiple supporting factors. Therefore, to optimize the development of students' cultural literacy, it is necessary to integrate various learning media and educational environments.

The analysis was also complemented with an effect size test using the f^2 value to assess the contribution of the learning media variable to cultural literacy. The f^2 value obtained is 0.658 and is in the large category based on the calculation results. This shows that the Augmented Reality-Assisted Moral Dilemma-Based Civics Learning Media strongly influences students' cultural literacy, meaning it not only has an effect but also makes a significant contribution to the research model. Moreover, significance testing was performed to assess the statistical significance of the relationships between variables in the research model. The tests were performed by analyzing the t-statistics and p-values. The results of the significance of the relationships among variables are shown in Table 4.

Table 4. Significance Test of Relationships Among Variables

	Original Sample	Sample Mean	Standard Deviation	T Statistics (|0/STDEV|)	P values
Moral Dilemma-Based Civics Learning Media Augmented Reality	0.584	0.562	0.210	2.781	0.006

The Original Sample value in Table 4 shows that the path coefficient is 0.584. This means that the relationship between Moral Dilemma-Based Civics Learning Media Assisted by Augmented Reality and cultural literacy is positive. The sample mean is 0.562, which is the mean estimate of the path coefficient obtained from the bootstrapping process. At the same time, the Standard Deviation of 0.210 shows a relatively low level of data dispersion, which shows that the parameter estimate is sufficiently stable. The t-statistic and p-value were used to test the significance of the relationships among variables in the research model. The value of the t-statistic indicates the strength of the influence of an independent variable on a dependent variable, while the p-value indicates the significance level of the influence. Furthermore, the predictive validity of the model for the cultural literacy variable was tested using a predictive relevance test (Q 2). The analysis results showed a Q^2 of 0.397 (>0), indicating that the model has good predictive ability. That is to say, the model used in this study can represent the real situation of students' cultural literacy to a certain degree. In SEM-PLS-based research, a relationship is considered significant at the 5% level if the t-statistic is greater than 1.96 and the p-value is less than 0.05. The analysis revealed a t-statistic of 2.781 and a p-value of 0.006. These values met the pre-set criteria for significance, indicating that the relationship between the variables is statistically significant. Thus, Moral Dilemma-Based Civics Learning Media Assisted by Augmented Reality has a positive and significant impact on students' cultural literacy. The findings provide empirical evidence that technology-based learning

innovations, together with value-based approaches in Civic Education, can greatly contribute to the development of students' cultural competencies.

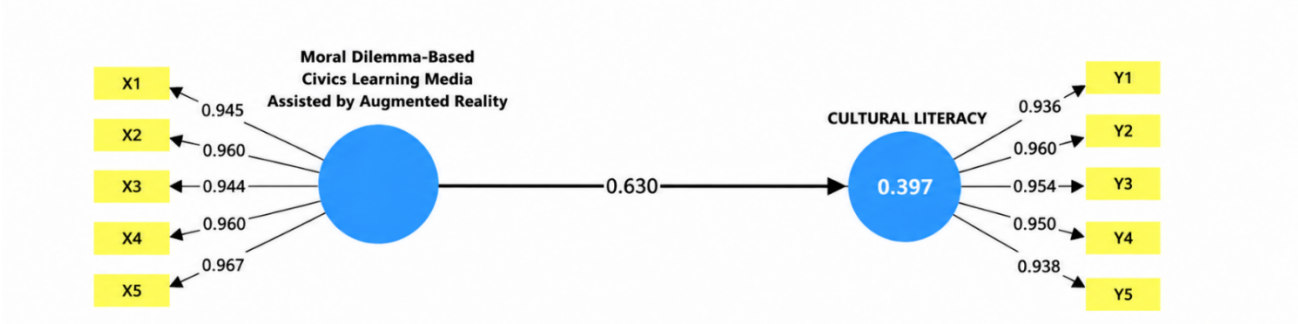


Figure 1. Structural Model of the Influence of Moral Dilemma-Based Civics Learning Media Assisted by Augmented Reality on Students' Cultural Literacy

Figure 1 shows the relationships among the variables in this study. The arrows indicate the direction of influence of the independent variables on the dependent variables. Conversely, the numbers written on each arrow are the path coefficient (β) values that represent the magnitude and direction of the influence. If the coefficient is positive, then as the independent variable increases, the dependent variable also increases. The dependent variable also gives the R-Square (R2) value. This value measures how much of the dependent variable is explained by the independent variables in the model. The higher the R-Square value, the better the model explains the dependent variable. Hence, the structural model figure provides a general idea of the direction of influence and the magnitude of relationships among the variables studied in this study. This model visualization also simplifies the interpretation of results and allows readers to better understand the relationships between variables without relying solely on numerical analysis.

The analysis in this study shows that Moral Dilemma-Based Civics Learning Media Assisted by Augmented Reality has a positive and significant effect on Students' cultural literacy. The results of testing the structural model are also reflected in these results, with a path coefficient of 0.630, a t-statistic of 2.781, and a p-value of 0.006, indicating that the relationship between the variables is statistically significant. The findings of this research are in line with Vygotsky's social constructivist theory, which states that the learning process is built upon social interaction, contextual experiences, and active participation of students in constructing knowledge (Wibowo et al., 2025). In this study, the use of augmented reality media based on moral dilemmas provides opportunities for students to actively interact with social and cultural situations visualized by digital technology, making learning more meaningful, reflective, and contextual. These findings also support Salmons (2009) on e-social constructivism, stating that digital technology may enhance collaborative processes and knowledge construction in socially interactive learning environments.

The findings of this study also have implications for Lawrence Kohlberg's theory of moral development, which highlights that students' moral development occurs through reasoning processes within the framework of moral dilemma situations (Bush, 2014). The learning media based on moral dilemmas used in this study helped students consider various perspectives, understand the social consequences of actions, and develop tolerant attitudes toward cultural diversity. These results are in line with Koçoğlu (2020), who found that moral dilemma-based learning can improve moral reasoning skills and value transfer in education. Therefore, including moral dilemmas in Civic Education learning not only increases students' cognitive abilities but also makes it easier to develop moral and cultural values in social life.

Moreover, the findings from this study can be interpreted through James Rest's theory of moral action, which suggests that moral behavior is determined by four basic elements: moral sensitivity, moral judgment, moral motivation, and moral character (Yavari, 2023). Interactive visualizations in augmented reality-based learning media can help students better understand moral situations more realistically, improving their moral sensitivity and ethical decision-making abilities. Morrill and Westrick (2022) showed that the use of simulations and affective learning may improve students' ability to make moral decisions. In the study, students were trained not only to understand citizenship materials theoretically, but also to show social empathy, value cultural diversity, and make reflective moral decisions.

The results of this study also corroborate prior research on the educational effects of augmented reality. According to Zhang et al. (2022), augmented reality can boost students' engagement, motivation, and understanding through interactive and immersive learning experiences. Ozdemir et al. (2018) obtained similar results, finding that the use of augmented reality had a positive effect on learning outcomes compared to conventional learning methods. In this study, the use of augmented reality helped learners comprehend social and cultural situations more concretely, making Civic Education, previously theoretical, more realistic and closely related to everyday life. The condition allowed students to participate more actively in discussion, think critically, and develop reflective capacities on cultural and civic issues.

The results of this study are also consistent with previous studies on moral dilemmas, which indicate that moral dilemmas can help students develop ethical decision-making skills and moral reasoning by engaging them in value-conflict situations (McCullough & Faught, 2005). Niforatos et al. (2020) showed that the virtual technology used in moral dilemma simulations can facilitate emotional engagement and enhance the quality of students' decisions. In this study, the combination of moral dilemmas and augmented reality offered a more real-life educational experience, helping students gain greater awareness of cultural values and social issues. Moreover, the findings of this study further support the notion of cultural and civic literacy, which emphasizes the value of education in fostering tolerance, valuing diversity, and encouraging students' social participation (Flornes, 2017). Civic literacy is closely related to students' social sensitivity in community life, according to Irayanti et al. (2026). In addition, Ginting et al. (2026) explained that educational environments, cultural openness, and social interaction are important factors in developing students' cultural literacy. Thus, the findings of this study indicate that Augmented Reality-Assisted Moral Dilemma-Based Civics Learning Media can be an effective learning innovation for improving students' cultural literacy through contextual, interactive, and value-based learning experiences.

Based on the R-Square value of 0.397, the learning media can explain 39.7% of the variation in students' cultural literacy. Although this is in the moderate category, the results show that the learning media has a significant contribution to students' cultural literacy development. The results of this study support Ginting et al. (2026) regarding the influence of several factors on cultural literacy, such as the family environment, school culture, social interaction, cultural openness, and access to information. Therefore, the development of cultural literacy cannot be based exclusively on learning media but needs support from broader educational and social environments. Thus, it can be concluded that integrating augmented reality technology and the moral dilemma approach in Civic Education learning is a learning innovation that is highly relevant to the needs of 21st-century education. The aim of learning is not only mastery of subject matter, but also the building of character, critical thinking skills, social sensitivity, and students' cultural literacy. Thus, Moral Dilemma-Based Civics Learning Media Assisted by Augmented Reality can be considered an effective learning approach in supporting the development of citizens who are critical, tolerant, and culturally aware.

CONCLUSION

Moral Dilemma-Based Civics Learning Media Assisted by Augmented Reality has a positive and significant effect on students' cultural literacy. The results of the SEM-PLS analysis show that the path coefficient of learning media on cultural literacy is 0.630, the t-statistic is 2.781, and the p-value is 0.006. Thus, it can be concluded that there is a significant relationship between learning media and cultural literacy. The results showed that using augmented reality-based learning media can create a more interactive, contextual, and reflective learning process, helping students understand cultural values, develop tolerant attitudes, and strengthen their ability to respond to cultural diversity in everyday life. This research also shows that using moral dilemmas in Civic Education learning can encourage students to think critically, develop social empathy, and consider various perspectives when making moral decisions. The use of augmented reality technology makes Civic Education learning more concrete and engaging by enabling students to see visual and interactive representations of social and cultural situations. So, AR-based Civic Education learning media has a dual function: as a medium to deliver learning materials and as a medium to strengthen character, civic values, and students' cultural literacy. The R-Square value of 0.397 shows that the learning media can explain 39.7% of the variance in students' cultural literacy. In contrast, the remaining variance is caused by factors outside the scope of this study, such as family environment, campus culture, social interaction, learning experiences, and students' individual characteristics. Thus, the development of cultural literacy should be done holistically by supporting various aspects of education, formal and non-formal. The results motivate lecturers and educators to use augmented reality-based learning media as an alternative innovation in Civic Education to improve students' engagement, critical thinking skills, and cultural literacy. Higher education institutions are also expected to support the implementation of technology-based learning by providing facilities and opportunities for professional development to lecturers. Furthermore, future researchers can build on this study by adding other variables that affect cultural literacy, including a wider range of subjects, and investigating the effectiveness of augmented reality-based learning media at other educational levels and in different learning contexts.

DECLARATION OF GENERATIVE AI

The authors declare that no generative AI or AI-assisted technologies were used in the writing process of this manuscript.

CONFLICTING INTEREST STATEMENT

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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