

Development and Effectiveness Testing of a Quizizz-Based Smart Game to Enhance Moral Values in Early Childhood: A Research and Development Approach

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Abstract

Digital learning media have considerable potential to support moral development in early childhood when designed according to children's developmental characteristics and meaningful social contexts. This study aimed to develop and examine the effectiveness of a Quizizz-based Smart Game in strengthening children's moral values, particularly honesty, discipline, independence, and cooperation. The study employed the Borg and Gall Research and Development model combined with a quasi-experimental non-equivalent group pretest-posttest design. The participants were 31 children aged 5–6 years from two early childhood education institutions in Banyumas, Central Java, comprising 15 children in the experimental group and 16 in the control group. The product was validated by three experts and obtained an average feasibility score of 3.47, categorized as very feasible. The moral-value instrument initially consisted of 12 items, of which 10 were valid, with a Cronbach's Alpha coefficient of 0.872. The pretest results indicated no significant difference between the experimental and control groups ($p = 0.889$). Following the intervention, the experimental group achieved a mean N-Gain of 75.34%, compared with 36.64% in the control group. An independent-samples t-test showed a significant difference in N-Gain between the two groups ($t = 25.879$, $p < 0.001$). These findings indicate that the Quizizz-based Smart Game can effectively support the strengthening of moral values in early childhood through interactive, contextual, and play-oriented digital learning.

Keywords: Quizizz; Smart Game; Moral Values; Early Childhood Education.



Introduction

National data indicates that violence and moral crises among children remain serious issues in Indonesia. Data from the National Police's Pusiknas records physical abuse as the most prevalent crime (23.672 cases), followed by group assault (9.280 cases), while SIMFONI-PPA documents thousands of cases of violence against women and children, including toddlers and those in early childhood (*Semester I 2026: Penganiyaan Menjadi Potret Baru Kriminalitas Di Indonesia | Pusiknas Bareskrim Polri*, n.d.) The Indonesian Child Protection Commission (KPAI) has also reported thousands of child protection complaints, predominantly involving problematic parenting patterns and a lack of early moral value instillation (Miranda et al., 2025). These conditions highlight the importance of strengthening moral values from early childhood, when children's moral and social development is progressively formed (Marwany et al., 2022b; Mukarromah, 2022). Therefore, early childhood education requires learning approaches that are safe, interactive, contextual, and appropriate to children's developmental characteristics (Hiola & Muis, 2025; Miranda et al., 2025).

These findings underscore the urgent need for moral intervention starting in early childhood (PAUD) through learning formats that are safe, interactive, and easily adopted by both teachers and parents. Quizizz-based educational games incorporating local values offer a potentially effective solution; their interactive quiz format can instill moral reasoning and positive social norms without triggering re-traumatization in children (Deviana & Sulistyani, 2021). The use of digital learning media can also provide interactive experiences and support children's engagement in learning activities (Hafidz et al., 2025). Furthermore, the integration of local wisdom into learning can make moral content more contextual and meaningful for children (Hiola & Muis, 2025; Marwany et al., 2022).

Theoretically, this approach aligns with the pre-conventional stage of Kohlberg's moral development, wherein young children's understanding of right and wrong is heavily influenced by immediate consequences and external authorities such as teachers and parents (Nahdi, 2021; Piaget, n.d.). Local wisdom embodies moral values relevant to character building, and integrating it into games has proven effective in instilling moral values and social skills in young children (Hiola & Muis, 2025; Prayitno et al., 2022). Previous research has indeed demonstrated that Quizizz is effective in enhancing children's motivation and learning outcomes (Braun & Clarke, 2006; Edwards et al., 2006; Fariza et al., 2024) however, these findings suffer from three fundamental limitations: first, they are descriptive in nature and focus on academic or linguistic aspects rather than the construct of moral values; second, effectiveness was not measured using psychometrically validated instruments, making claims of success difficult to replicate or compare empirically; and third, none employed a controlled research design that would allow for a causal attribution between Quizizz usage and changes in children's moral values (Marwany et al., 2022; Yusup et al., 2023). This gap serves as the starting point for the present study: to the best of the researchers' knowledge, no study has yet systematically implemented and tested the "Smart Game Quizizz" for reinforcing moral values in early childhood using validated instruments and a quasi-experimental design.

Addressing this gap, this study implements a Quizizz-based Smart Game Activity as an innovation to foster moral values in early childhood, featuring three novel aspects: (1) the systematic application of Quizizz games specifically designed to stimulate moral reasoning and behavior, rather than focusing merely on general academic content; (2) the development of a moral value instrument tailored to the

digital game context that has been validated for both validity and reliability; and (3) empirical evidence, obtained through a quasi-experimental design, demonstrating that digital games can reinforce rather than undermine children's moral values. The integration of digital games with local wisdom provides opportunities to present moral values through contextual and meaningful learning experiences (Deviana & Sulistiyani, 2021; Hiola & Muis, 2025). Such contextualization can help connect children's learning experiences with moral values embedded in their social and cultural environment (Marwany et al., 2022; Miranda et al., 2025). This study aims to implement and evaluate the effectiveness of the Quizizz Smart Game in developing moral values in early childhood, specifically regarding honesty, discipline, independence, and cooperation.

Research Method

This study employs the Borg and Gall Research and Development (R&D) model, utilizing a systematic development process to produce an empirically tested learning product suitable for implementation in early childhood education (ECE) institutions (Bartlett & Burton, 2024; Sugiyono, 2016). The resulting product is a "Smart Game Activity" based on the Quizizz platform, designed to foster moral values in early childhood. The Borg and Gall model comprises ten stages: (1) analysis of potential and problems, (2) data collection, (3) product design, (4) design validation, (5) limited-scale product trial, (6) product revision, (7) usage trial, (8) design revision, (9) final product revision, and (10) production.

Specifically, the final product named the "Quizizz Moral Game" is designed as an interactive quiz featuring 20 questions that address four moral value indicators: honesty, discipline, independence, and cooperation. The game's content incorporates two local folktales from the Banyumas region, the Legend of Baturraden and the Story of the Pelus River, to convey moral messages that resonate with the children's daily lives. In terms of features, the product includes a scoring system and tiered challenges, interactive feedback provided immediately after a child answers, and audio instructions to assist children who are not yet fluent readers; visual elements such as icons, colors, and animations are tailored to the developmental characteristics of 5-to-6-year-old children. Regarding implementation, the game is played using [type of device used, e.g., school laptops/tablets connected to a shared screen], with children responding to questions [individually/in turns/in small groups; please adjust according to actual implementation] under teacher supervision during each session.

The study was conducted at two ECE institutions in Banyumas Regency, Central Java: RA Rumah Kreatif Wadas Kelir, serving as the experimental group ($n = 15$), and RA Muslimat NU 13 Sokaraja, serving as the control group ($n = 16$). The selection of the two sites was based on the consideration that RA Rumah Kreatif Wadas Kelir possesses a progressive learning culture, openness to media innovation, and adequate technological facilities, making it suitable to serve as the experimental group; conversely, RA Muslimat NU 13 Sokaraja exhibits relatively conventional learning characteristics with limited use of digital media, making it appropriate as the control group to provide an objective comparison. A purposive non-random sampling technique was employed to ensure class homogeneity in alignment with the research objectives. With a total of 31 participating children ($n = 15$ experimental, $n = 16$ control), the sample size is relatively limited and reflects a small-scale trial phase within the Borg and Gall R&D framework; consequently, generalizing the findings to the broader early childhood population requires caution, as discussed further in the section on limitations. The research design employed is presented in Table 1.

Table 1. Quasi-Experimental Research Design

Group	Pretest	Treatment	Posttest
Experiment (RA Wadas Kelir)	O1	X (Smart Game Quizizz)	O2
Control (RA Muslimat NU 13)	O1	– (conventional learning)	O2

Table 1. is used because class division in early childhood education institutions does not allow for full randomization, so the groups that have been formed (*intact groups*) are used as is. A pretest was conducted to determine the achievement of children's initial moral values before treatment was given, while the effectiveness of the product was assessed through the increase in moral values measured using a moral values questionnaire that has been tested for validity with Pearson Product-Moment and reliability with Cronbach's Alpha.

Development Instruments and Procedures

The main instrument of this study was a questionnaire on the development of children's moral values, consisting of 12 statements, completed through teacher observations while children were playing a Quizizz-based digital game, using a Likert scale of 1–5 (1 = very inappropriate, 5 = very appropriate). Product validation was carried out by three experts: a learning media expert who assessed the technical aspects, aesthetics, interactivity, and appropriateness of the Quizizz platform's appearance for early childhood; a child moral development expert who assessed the suitability of the material to the stages of moral and socio-emotional reasoning development of early childhood; and an early childhood education learning methods expert who assessed the suitability of the game with learning theory, competency suitability, and the integration of moral values into play activities. The assessment used a Likert scale of 1–4 with the following criteria: 3.26–4.00 very appropriate; 2.51–3.25 appropriate; 1.76–2.50 quite appropriate; and 1.00–1.75 less appropriate, referring to criteria commonly used in research on the development of similar instruments (Rukajat & Makbul, 2022; Sutijan et al., 2015).

The validity of the moral values questionnaire instrument was tested quantitatively using Pearson Product Moment correlation through SPSS, with the criteria for items being declared valid if the calculated r value is ≥ 0.30 and significant at the 5% level ($p < 0.05$) (Sihotang, 2023). The reliability of the instrument was tested using the Cronbach's Alpha method, with the criteria for the instrument being declared reliable if the Alpha value is ≥ 0.70 (Zayrin et al., 2025). The implementation procedure followed the ten stages of Borg and Gall, including analysis of potential and problems through observation and initial interviews at both PAUD institutions; data collection through literature studies and teacher interviews; design of a Quizizz game prototype containing everyday moral situations and local Banyumasan stories (Baturraden Legend and Pelus River Story); validation by three experts; limited trials for technical improvements; field trials using a pretest-posttest design in the experimental and control groups; and refinement of the final product based on the results of statistical analysis and teacher input.

The Smart Game Quizizz treatment in the experimental group was implemented in [number of sessions, e.g., 6 sessions] of scheduled learning over a period of [total duration, e.g., 3 weeks], with each session lasting approximately [session duration, e.g., 30–45 minutes] as part of the classroom routine. To maintain consistency between sessions, the teacher followed the same standard procedures at each meeting, including explaining the game instructions, guiding the navigation of the Quizizz application, and monitoring that all children in the experimental group completed the same game items in the same order. During the same period, the control group underwent conventional learning according to the

regular curriculum without *the Smart Game Quizizz intervention*, so that differences in results between groups can be more attributable to the treatment provided.

Data Analysis Techniques

Data analysis in this study was conducted through two approaches that were equivalent to the data obtained. First, development data analysis: qualitative data from observations and interviews were analyzed through data reduction, data presentation, and conclusion drawing (Emzir, 2019). Quantitative data from expert validation were analyzed using the feasibility percentage technique to determine the quality of product design. Second, product effectiveness data analysis, including: (1) normality test using Shapiro-Wilk to ensure that pretest and posttest data were normally distributed; (2) homogeneity test using Levene's test to determine the equality of variance between groups; (3) balance test (independent sample t-test) on pretest scores to ensure that the initial conditions of the moral values of both groups were equal; (4) N-Gain Score analysis to determine the extent of strengthening of children's moral values after treatment, with high categories (≥ 0.70), medium ($0.30-0.69$), and low (< 0.30); and (5) calculation of Cohen's d effect size corrected with Hedges' g to strengthen the interpretation of the practical significance of the differences between groups (Aini, 2021)

Potential and Problem Analysis

Observations and interviews at the Wadas Kelir Creative House RA and the NU 13 Sokaraja Muslimat RA showed that teachers recognize the importance of strengthening moral values, but the media used is still conventional, making it less engaging for children. Interactive digital learning media specifically designed to strengthen moral values is also not yet available. Teachers expressed the need for media that is more relevant to children's daily lives, easy to use, and able to stimulate moral reasoning in a fun way. These findings provide a strong foundation for the implementation of a smart game based on the Quizizz app.



Figure 1.
RA Masyithoh NU 13 Sokaraja



Figure 2.
RA Wadas Kelir Creative House

Figures 1 and 2 show that researchers conducted trials 1 and 2 in game - based digital learning, which allows teachers to present learning materials in the form of engaging and fun interactive quizzes. This platform combines game elements, such as scoring, challenges, and immediate feedback, thereby increasing children's motivation and engagement during the learning process. In early childhood learning, Quizizz can be used to introduce basic concepts, such as letters, numbers, colors, shapes, vocabulary, and thematic knowledge through visual displays, images, audio, and animations that are appropriate to children's developmental characteristics.

Utilizing Quizizz in children's learning provides an active, learner-centered learning experience. Teachers can utilize various available features to tailor materials to learning objectives and children's developmental needs. In addition to simplifying the evaluation process through automated scoring, Quizizz can also be integrated with local wisdom, folk tales, and traditional games, making learning more contextual and meaningful. From this perspective, Quizizz functions not only as an evaluation tool but also as an innovative learning tool that supports the development of children's cognitive abilities, language skills, and moral development through playful learning activities.

Information Gathering and Initial Product Development

Literature studies and in-depth interviews yielded two important findings: (1) digital game learning models are effective in increasing motivation and engagement in early childhood, and (2) moral scenarios packaged through games can strengthen children's reasoning and moral behavior (Adrianus Benufinit & Malaikosa, 2024). Information on child development was used to adapt game content to the cognitive and moral stages of children aged 5–6 years, while information on local wisdom was used to select relevant content, such as simple ngapak language, local cultural icons, and local folklore as a framework for conveying moral messages. The initial product produced was the "Quizizz Moral Game," which contained 20 questions containing moral value indicators (honesty, discipline, independence, and cooperation), lifting the Baturraden Legend and the Pelus River Story as the main content, equipped with interactive feedback and audio instructions to make it easier for children to follow the game (Adrianus Benufinit & Malaikosa, 2024; Trisnawati & Fauziah, 2019). The game was implemented gradually in several scheduled learning sessions as part of routine classroom activities, with teacher assistance at each session to explain instructions, guide application navigation, and maintain consistency of implementation in the experimental group.

Product Validation Results by Experts

Expert validation was conducted to ensure that the media used was appropriate, relevant, and suited to the characteristics of early childhood. Media experts assessed that the smart game's appearance was appropriate to the characteristics of early childhood learning, particularly in terms of color, icon size, and navigation, with recommendations for simplifying several interactive buttons. Child moral development experts assessed that the game's content was appropriate to moral development needs and was able to stimulate moral reasoning through the activities of choosing, responding, and observing, with recommendations for clarifying several verbal instructions. Learning methods experts assessed that the game was appropriate to the play-based learning approach typical of early childhood education and recommended strengthening the moral value indicators in each question item. The results of the three expert validations are presented in Table 2.

Table 2. Expert Validation Results for the Smart Game Quizizz Product

No	Validator	Rated aspect	Score	Category
1	Media Expert	Suitability of the instrument with Quizizz media, readability, and appearance for early childhood	3.4	Very Worthy
2	Child Moral Development Expert	Relevance of indicators to aspects of honesty, responsibility, cooperation, religiosity, and social concern	3.7	Very Worthy
3	Learning Methods Expert	Suitability of the instrument with the aim of strengthening moral values, integration of indicators, and clarity of language	3.3	Very Worthy
Overall average			3.47	Very Worthy

Based on the validation results in Table 2, the average score of the three validators was in the range of 3.26–4.00, thus the instrument and research product were declared very suitable for use. Input from the experts was then accommodated, including improvements to item wording, the addition of cooperation indicators, and language simplification, so that the instrument met content validity and was ready for use in the field trial phase.

Results of Instrument Validity and Reliability Tests

The validity of the early childhood moral values instrument, consisting of 12 statements, was tested using the corrected item-total correlation technique in SPSS. The calculation results showed that of the 12 items, 10 were declared valid and 2 were declared invalid, as presented in Table 3.

Table 3. Results of the Validity Test of Moral Values Instrument Items

Statement Items	r count	Sig. (p)	Information
Point 1 – Doing assignments alone (independence)	0.759	0.0006	Valid
Point 2 – No cheating (honesty)	0.840	0.0000	Valid
Point 3 – Admitting mistakes (honesty)	0.888	0.0000	Valid
Point 4 – Independence in playing (independence)	0.860	0.0000	Valid
Point 5 – Choose independently (independence)	0.835	0.0001	Valid
Point 6 – Responsible for completing tasks	0.882	0.0000	Valid
Point 7 – Obey the rules (discipline)	0.874	0.0000	Valid
Point 8 – Give friends opportunities (cooperation)	0.834	0.0001	Valid
Point 9 – Encourage discussion (cooperation)	0.912	0.0000	Valid
Point 10 – Maintain cleanliness (responsibility)	0.949	0.0000	Valid
Item 11 – Tidy up play equipment	0.116	0.670	Invalid
Point 12 – Don't make noise	0.119	0.660	Invalid

After the validity test, a reliability test was conducted using the Cronbach's Alpha method on the 10 items declared valid. The calculation results showed a Cronbach's Alpha value of 0.872. Referring to the reliability criteria, an instrument is declared reliable if the alpha value is ≥ 0.70 ; thus, this instrument is in the highly reliable category, which means the consistency of answers between items is very good and the instrument can be trusted to be used to measure the strengthening of moral values in early childhood in the context of learning digital games based on Quizizz (Hani et al., 2021).

Product Effectiveness Analysis

This study used a pretest-posttest design with a control group in two groups, namely the experimental group (receiving Smart Game Quizizz treatment) and the control group (conventional learning), with a purposive non-random sampling technique to determine relatively homogeneous experimental and control classes (Yam, 2024). The main instrument was a questionnaire on children's moral values with 10 valid statements on a Likert scale of 1–5, so that the possible score range obtained by respondents was 10 to 50, where the higher the score obtained, the better the strengthening of the observed children's moral values.

Prior to hypothesis testing, prerequisite tests were conducted in the form of a normality test (Shapiro-Wilk, because the number of respondents in each group was <50) and a homogeneity test (Levene). The test results showed that the pretest and posttest data in both groups were normally distributed (significance > 0.05) and the variance between groups was homogeneous (Levene's significance = 0.897 > 0.05), as summarized in Table 4.

Table 4. Results of Data Normality and Homogeneity Tests

Group	Data	Sig. Shapiro-Wilk	Information
Experiment	Pretest	0.550	Normal
Experiment	Posttest	0.134	Normal
Control	Pretest	0.760	Normal
Control	Posttest	0.123	Normal
Homogeneity of pretest variance (Levene)		0.897	Homogeneous

The balance test (independent sample t-test) on the pretest scores showed a t value of 0.140 with a significance of $p = 0.889$ (> 0.05), indicating that there was no significant difference in the average initial moral values between the experimental and control groups before the treatment was administered. Thus, both groups were in equal initial conditions, as presented in Table 5.

Table 5. Independent t-Test Results of Pretest Scores (Initial Equality Test)

t	df	Sig. (2-tailed)	Information
0.140	29	0.889	Not significantly different (equivalent)

To test the effectiveness of the treatment, an N-Gain Score analysis was conducted which compared the actual score increase with the maximum possible score increase, with interpretation categories as in Table 6.

Table 6. N-Gain Interpretation Categories (%)

Percentage (%)	Interpretation
< 40	Ineffective
40 – 55	Less effective
56 – 75	Quite effective
> 76	Effective

The results of the analysis of Table 6 show that the average N-Gain of the experimental group was 75.34% (high category), with a minimum value of 57.89% and a maximum of 84.21%; while the average N-Gain of the control group was 36.64% (medium category), with a minimum value of 21.05% and a maximum of 43.33%, as summarized in Table 7.

Table 7. Descriptive Statistics of N-Gain of Experimental and Control Groups

Group	Average N-Gain (%)	Category	Range (Min–Max)
Experiment	75.34	Tall	57.89 – 84.21
Control	36.64	Currently	21.05 – 43.33

To ensure that the difference was due to the treatment and not by chance, an independent t-test was conducted on the N-Gain scores. The Levene test results showed that the variances of both groups were homogeneous ($\text{sig.} = 0.226 > 0.05$), so the interpretation used the assumption of equal variances. The t-test results showed a value of $t = 25.879$ with $df = 29$ and a significance of 0.000 ($p < 0.001$), so it can be concluded that there is a significant difference in effectiveness between the use of Quizizz media and conventional media in developing moral values in early childhood (Deviana & Sulistyani, 2021b), as summarized in Table 8.

Table 8. Results of Independent t-Test on N-Gain Score

t	df	Sig. (2-tailed)	Average Difference	Note:
25,879	29	0,000	48.71	Significant

To assess the practical significance of the treatment, the effect size was calculated using Cohen's d based on the mean difference of 48.71 and the pooled standard deviation estimate of 5.24, resulting in an effect size of $d = 9.30$. Given the relatively small sample size, this value was corrected using Hedges' g to obtain $g = 9.06$. Based on general criteria, this value is categorized as extremely large. This finding indicates that the implemented learning intervention has the potential for a substantial impact on strengthening children's moral values in the context of this study.

However, the magnitude of this value is likely influenced by the small sample size and low score variability in the experimental group, making these results less generalizable to the broader population. The wide confidence interval also indicates that this estimate lacks precision, a natural consequence of the limited sample size. Therefore, this finding should be interpreted as an initial indication that the intervention had a visible impact in this study sample, rather than as definitive proof of the true effect size. Replication with a larger sample size and more representative score variability is needed to confirm the consistency of this finding before it can be generalized more broadly. Based on educational meta-analyses synthesized by Hattie, typical educational effect sizes are in the range of 0.2–0.8. Therefore, the effect size findings in this study are an anomaly that needs to be replicated in a larger sample. Therefore, the researchers in this case emphasize the strong initial indication of effectiveness without overly generalizing the findings.

Discussion

The results of the study indicate that the implementation of the Smart Game Quizizz significantly developed the moral values of early childhood. This finding is evident from the N-Gain of the experimental group, which was much higher than the control group, as well as a very large effect size ($g = 9.06$), which indicates that the implementation of digital games has a strong and consistent impact on strengthening children's moral values. This finding supports the view in Kohlberg's theory of moral development that children's moral reasoning in the preconventional stage develops optimally when they are repeatedly faced with situations that require choices between right and wrong accompanied by immediate feedback, as facilitated by the scoring mechanism and instant feedback in Quizizz (Islamic et al., 2024). Therefore, children who get the truth in Quizizz will feel happy, touched, and surprised, and they can complete the challenge. This is also in line with Piaget's theory of heteronomous morality, where early childhood still needs consistent external references (game rules, teacher directions) as a foundation before their moral reasoning becomes more autonomous.

These results also align with findings that digital games with gamification mechanisms can stimulate prosocial behavior, improve concentration, and foster children's independence in completing learning challenges (Eğitimi et al., 2021). In the context of this study, the Quizizz game challenges, which contain everyday moral situations and are contextualized with Banyumasan local wisdom, bring children closer to moral values such as cooperation (gugur gunung), honesty (temen), and discipline from the Baturaden and Kali Pelus stories, with the moral value design in the Quizizz game. Framing moral values through a cultural context familiar to children not only makes learning activities more enjoyable but also helps children internalize moral values as something concrete and close to their daily lives, rather than just abstract concepts.

More specifically, the findings of this study complement those emphasizing the importance of contextual values education in digital media (Komalasari & W.S., 2023). However, previous research has tended to develop story-based media or video playbacks for the Baturaden and Kali Pelus stories, while this study replicates this with a game consisting of questions and points for children to participate in. This is because the Quizizz game is specifically designed to stimulate children's moral reasoning and behavior in an active, interactive, and measurable manner. From this, this study provides a theoretical contribution by expanding the application of moral development theory to assessment gamification platforms, while also demonstrating that the preconventional stages of moral reasoning in children aged 4-6 years can be more structuredly stimulated through digital game design.

The effectiveness of this game can also be understood through the perspective of *Self-Determination Theory* (SDT). The Quizizz-based game provides children with the opportunity to fulfill three basic psychological needs: autonomy, competence, and relatedness. Autonomy is evident in children's ability to determine answers independently, while competence develops through the experience of completing game challenges and receiving direct feedback. Meanwhile, relatedness is formed through interaction, cooperation, and peer support throughout the game. Fulfilling these three psychological needs can further foster the development of positive moral values, such as honesty, independence, and responsibility. This contrasts with conventional learning, which tends to be teacher-oriented, leaving children with relatively limited opportunities to make decisions and practice moral behavior independently (Mukarromah, 2022).

The research also shows that children respond positively to games that present moral messages through situations and contexts close to their lives. This finding reinforces the view that the use of contextual learning media has great potential to aid the internalization of moral values in children. Through this approach, moral values are not only acquired cognitively but also internalized and practiced through play experiences that directly involve children in decision-making and action. (Yumriani, 2022). The main advantage of this research lies in the combination of Kohlberg-Piaget's hierarchical moral reasoning with digital gamification in a single structured intervention model through Borg and Gall's R&D, resulting in a product that is not only valid in content (through expert testing) but also proven effective in the field.

In terms of novelty, this study provides several important scientific contributions: (1) systematically applying the Quizizz game as a medium for strengthening moral values, which has not been widely done in previous studies that generally only use general content or academic materials; (2) developing a moral value instrument that is specific to the context of digital games and has been tested as valid and reliable; (3) proving that digital games can strengthen children's moral values, not weaken them as feared by several critics of the digitalization of early childhood education; and (4) producing a

very large effect size, which indicates strong intervention effectiveness and exceeds many previous studies in the field of early childhood moral education. From this, this study not only adds empirical evidence regarding the effectiveness of digital games in learning, but also offers a new perspective that digital gamification can be an effective means for strengthening children's moral values from an early age (Hidayati & Aslam, 2021).

However, the application of digital media such as Quizizz in early childhood learning still has limitations that need to be considered, such as dependence on devices and internet connections, the risk of excessive screen time, and the need for adult guidance to ensure children's interactions with screens remain directed towards learning objectives (Ryan & Deci, 2020). Compared with international studies that highlight the importance of meeting basic psychological needs and character development from an early age (Aslan, 2024; Edwards et al., 2006), the findings of this study strengthen the evidence that carefully designed digital media can complement, not replace, human interactions between children, teachers, and parents in strengthening moral values.

Conclusion

The Smart Game Quizizz has been proven effective in developing moral values in early childhood, particularly in the areas of honesty, discipline, independence, cooperation, and responsibility. The product, developed through the Borg and Gall R&D process, has been validated by three experts and supported by reliable instruments, with test results showing a significant impact on strengthening children's moral values. For early childhood education teachers, these findings offer an alternative interactive learning medium that is easily integrated into routine classroom activities; for curriculum developers, this product can serve as a reference in designing technology-based character-building media; and for early childhood education policymakers, these results emphasize the importance of supporting the adoption of pedagogically designed and empirically validated digital media. This study has several limitations that require attention. First, the study was only conducted in two early childhood education institutions in the Banyumas region, so the findings cannot be broadly generalized to regions or institutions with different characteristics. Second, the limited sample size means that variations in children's moral value achievement are not fully represented. Third, learning effectiveness was measured over a relatively short period of time, so it does not reflect the sustainability of moral value strengthening in the long term. Additionally, the use of Quizizz as the primary platform makes learning highly dependent on device availability and network stability, which in practice can be a challenge in a number of PAUD institutions.

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