



Gamification Based Learning Media for Fostering Entrepreneurial Disposition in Early Childhood

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ABSTRACT

Instilling an entrepreneurial mindset from an early age has not yet become a solid foundation for developing an independent and adaptive generation. This study aims to test the effectiveness of gamification-based learning media in fostering entrepreneurial attitudes in early childhood. This research uses a modified Research and Development method by Borg & Gall, which consists of seven stages, such as needs analysis, design, product creation, expert validation, revision, pilot testing, and impact testing. Data was collected through behavioral observation, interviews, and questionnaires validated by experts. The pilot test was conducted in three early childhood education centers involving 30 children aged 5–6 years. The results show that gamification media is highly feasible, with an expert validation score above 90%, and significantly improves children's entrepreneurial traits such as independence ($p = 0.002$), initiative ($p = 0.005$), and problem-solving skills ($p = 0.001$). Gamification increases learning motivation and encourages positive social collaboration. In conclusion, contextually designed interactive gamification media effectively builds entrepreneurial foundations from an early age. This study contributes to the integration of gamification and entrepreneurship education within a contextual design framework, offering practical implications for early childhood education and introducing digital innovations that promote economic literacy from an early age.

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1. Introduction

Rapid global changes marked by the digital revolution and economic transformation require education to prepare a generation that is not only academically competent. The future generation is expected to be not only intellectually intelligent, but also adaptive to change, creative in problem solving, and possess a strong entrepreneurial spirit (Hasnida et al., 2023). Education is a strategic instrument in equipping individuals with the ability to survive, thrive, and contribute to a dynamic and complex society. Early childhood education occupies a position that cannot be underestimated in the framework of holistic human development. Early childhood is a golden age that determines the direction of a child's cognitive, affective, social, and moral development in the future (Alotaibi, 2024), not only does it serve to develop basic skills such as reading and arithmetic, but also to shape character, life values, and positive attitudes, including an entrepreneurial attitude as part of 21st-century competencies (Ismuni et al., 2024). The results of the study show that gamification effectively increases children's motivation to learn and supports the development of essential skills for future entrepreneurial success. These findings can be used as input for educators in kindergartens and policy makers at the regional level, including the Ministry of Education and Culture.

The grand theory underlying the understanding of the importance of stimulation at this stage is traced back to Piaget's cognitive development theory, which states that early childhood is in the pre-operational stage, where children learn actively through concrete, symbolic, and imaginative exploration. Their thinking processes develop through direct experience, not through verbal explanations alone (Khotimah, 2022). Vygotsky's social theory emphasises the role of social interaction, scaffolding from adults, and the cultural environment in shaping mindsets and the development of higher psychological functions. This theory reinforces the argument that early childhood is a highly potential period for shaping productive mindsets and entrepreneurial values such as initiative, independence, responsibility, and decision-making skills (Fadillah & Afandi, 2024). Reinforced by Theodore W. Schultz's human capital theory, it provides a macro perspective that investing in early childhood education is a long-term investment

that will produce high-quality, productive human resources capable of creating economic added value (Mahmoud, 2022; Lôbo et al., 2024; Laas et al., 2023). Early entrepreneurship education can be viewed as a preventive and promotive strategy to foster a generation that not only seeks employment but also creates job opportunities (Rafiuddin & Tasmin, 2023). Early childhood education has a dual urgency, as the foundation for character building and as the starting point for developing entrepreneurial capacity within the framework of sustainable economic development (Salsabila et al., 2023). Efforts to instil an entrepreneurial attitude are designed appropriately through approaches that are suitable for children, one of which is through gamification-based learning media, which is not only interesting and enjoyable but also effective in instilling entrepreneurial values and attitudes in a natural and integrated manner (Lorenzo-Lledó et al., 2023; Lumini et al., 2023).

Entrepreneurial attitudes in the context of early childhood education include the dimensions of independence, initiative, creativity, risk-taking, and the ability to solve simple problems (Mui Lee & Loo, 2021). These attitudes cannot be developed through traditional instructional approaches, but require learning strategies that are enjoyable, contextual, and meaningful in accordance with children's characteristics. One potential innovative approach is gamification, which is the application of game elements in a non-game environment to increase motivation and engagement in learning. Gamification media is developed in the form of interactive applications that integrate entrepreneurial values such as independence, creativity, cooperation, and perseverance into play and learning activities (Shan et al., 2024).

Several previous studies have examined the use of digital media and gamification in early childhood education, showing that game-based media can improve children's engagement and social-emotional skills (Bajac et al., 2024). The development of educational applications for early childhood education has not explicitly integrated entrepreneurial values and has not systematically developed specific entrepreneurial attitudes (Xueting, 2023) has not included simple economic content in children's learning and has not used a gamification approach. Other studies have found that entrepreneurship education programmes in ECE can improve children's problem-solving, decision-making, and teamwork skills (Valova et al. 2024; Lestari et al., 2024). One of the main challenges is the lack of learning media that is interesting, interactive, and suitable for children's characteristics. Existing learning media tend to be conventional and do not motivate children to learn about entrepreneurship. There is also a lack of knowledge, continuous guidance, and skills among educators in teaching entrepreneurial concepts, as well as minimal support from parents.

The state of the art of this research lies in the integration of gamification design principles, early childhood learning approaches, and entrepreneurship education into a single digital learning medium developed through a research and development (R&D) approach. The existence of this medium not only responds to the need for innovation in early childhood learning but also forms part of a strategy for early and contextual economic literacy for children. This research aims to fill the existing gap by developing and evaluating gamification-based learning media that can foster entrepreneurial attitudes in early childhood. Gamification was chosen because it has been proven effective in increasing children's motivation to learn, engagement, and understanding of learning materials, as well as testing its impact on improving entrepreneurial attitudes in early childhood.

Sustaining this research is essential because early childhood education plays a key role in building creativity, independence, collaboration, and problem-solving skills needed to face future social and economic challenges. The urgency of this work lies in the need to equip young children with strong character and entrepreneurial attitudes from an early age so they can grow into a resilient and creative generation ready to face uncertainty (Wardhani, 2022). Amidst the lack of educational media integrated with entrepreneurial values, this research is expected to fill this gap. This research also addresses the limited availability of learning media that integrate entrepreneurial values in early childhood education. By providing evidence that gamification can enhance motivation and foster early entrepreneurial attitudes, continued research is needed to examine its long-term impact, expand its application, and support curriculum development and policy decisions. Ultimately, sustained research will help create innovative and scalable learning practices that prepare children to thrive in a rapidly changing world. The novelty of this research is the development of a gamification-based learning media prototype specifically designed to shape the entrepreneurial attitudes of early childhood through a fun, participatory, and real-experience-based approach. Unlike previous studies that only emphasised cognitive or affective aspects in general, this study explicitly targets the entrepreneurial attitude variable in the context of early childhood education. The plan to solve the problem is through the development of innovative and contextual gamification-based learning media, training and mentoring of early childhood teachers in the implementation of entrepreneurship education, and increasing the involvement of parents and the community in early childhood entrepreneurship education. The main contribution of this research is to provide a new conceptual and practical basis for technology-based PAUD learning design that supports the strengthening of entrepreneurial character, while also providing guidance for curriculum developers, teachers, and early childhood education stakeholders in implementing gamification-based character education effectively and measurably.

2. Method

This study utilised a Research and Development (R&D) approach with the Borg & Gall model, which has been modified into seven stages. This model was chosen because it was in line with the research objective of developing and evaluating gamification-based learning media to foster entrepreneurial attitudes in early childhood. In addition, this study is also an evaluative research that aims to test the effectiveness of the developed product in achieving learning objectives (Dias et al., 2024; Rifa'i, 2023).

The research procedure adapts the Borg & Gall model in seven stages to develop and evaluate gamification-based learning media. The research stages began with stage 1, needs analysis, identifying needs and gaps in entrepreneurial learning media for children, including literature studies, observations, and interviews with early childhood education teachers (Kara & Russell, 2024; Nugraha, 2024). Stage 2, design planning, formulates SMART (Specific, Measurable, Achievable, Relevant, Time-bound) objectives, entrepreneurship content (concepts of money, saving, decision-making), visual design, and gamification elements such as points, levels, rewards, challenges, and leaderboards (Santos & Vieira, 2024). Stage 3, initial product development, produces media prototypes, gamification elements, and internal testing (Kusdiyanti et al., 2022). Stage 4, expert testing, involves media and PAUD experts for validation and recommendations. Stage 5, revision, improves the prototype based on expert input. Stage 6, limited testing, involved 60 children aged 5-6 years in three PAUDs with different characteristics in North Cimahi, South Cimahi, and Central Cimahi. The selection of PAUDs was conducted purposively, taking into account variations in socioeconomic background and parental education levels. Pre-tests, media use, observations, post-tests, and teacher interviews were conducted (Haq et al., 2024). Stage 7, data analysis, used a paired t-test for quantitative data (pre-post test) and content analysis for qualitative data (observations, interviews) to interpret the findings and compile a comprehensive report. This detailed design ensured the validity and reliability of the research findings.

The implementation of this research included obtaining permission from educators and parents, administering a pre-test to the children, followed by an intervention in the form of using gamification-based learning media for one month with guidance. Observation of children's behaviour while using learning media to observe engagement, social interaction, and problem-solving skills. Administering post-tests to children to measure their level of knowledge and entrepreneurial attitudes after using learning media, followed by interviews with educators to obtain information about their experiences in using learning media and its impact on children's learning motivation.

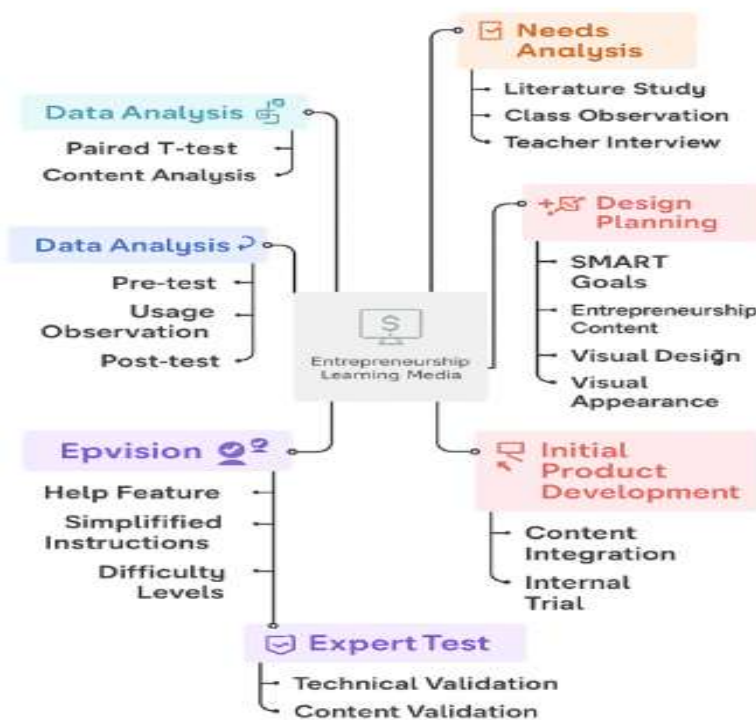


Figure 1. Research stage flow

The variables in this study include independent variables, gamification-based learning media. Dependent variables, early childhood entrepreneurial attitudes, which are measured through indicators of independence, initiative, and involvement in problem solving. The instruments used in this study include a questionnaire that has been validated with a Content Validity Ratio (CVR) exceeding 0.99 for all items and has high internal reliability with a Cronbach's alpha coefficient of 0.87. Observation sheets are used to observe children's behaviour while using learning media and interview guidelines.

Data were collected using a combination of techniques. The main method was structured non-participant observation, in which researchers did not take part in the activities but systematically observed children while they used the learning media. Observation sheets were employed to record key indicators, including independence,

initiative, problem-solving ability, and social interaction, ensuring consistent and objective documentation of children's behaviour during the intervention.

Data collection techniques used a combination of data collection techniques. The main method was structured non-participant observation, in which researchers did not take part in the activities but systematically observed children while they used the learning media. Observation sheets were employed to record key indicators, including independence, initiative, problem-solving ability, and social interaction, ensuring consistent and objective documentation of children's behaviour during the intervention. Structured non-participant observation was conducted using observation sheets to record indicators of children's independence, initiative, problem solving, and social interaction while using the media. Semi-structured interviews were conducted with early childhood educators and parents to explore their experiences of using the media, its impact on children (changes in attitude/behaviour), and their opinions. The interview guide contained open-ended questions to obtain in-depth answers (Ardiansyah et al., 2023). Closed and open questionnaires were used, with the closed questionnaire quantitatively measuring children's entrepreneurial attitudes (pre-post), and the open questionnaire collecting qualitative suggestions/opinions from media and PAUD experts. The questionnaire instruments included expert validation (Likert scale) and measurement of children's entrepreneurial attitudes tailored to early childhood. This combination of techniques produced rich and diverse data for in-depth evaluation (Putra et al., 2024).

Data analysis was conducted quantitatively and qualitatively. Quantitative analysis used pre-post test scores from the entrepreneurial attitude questionnaire, analysed using descriptive statistics (mean, SD, frequency) and inferential statistics (paired t-test) to identify significant differences. Content validity by experts and internal reliability (Cronbach's alpha) were tested to ensure the instruments were valid and reliable. SPSS/R was used for analysis. Qualitative data analysed interview transcripts, observation notes, and expert questionnaire responses through content analysis: transcription, code categorisation, and interpretation of main themes. Triangulation compared quantitative and qualitative findings to enhance validity (Mulyana, 2024). This combination of analyses provides strong evidence of the effectiveness of gamification media in fostering entrepreneurial attitudes.

Data validity was ensured through triangulation method (observation, interviews, questionnaires) and sources (children, teachers, parents, experts). Content validity is measured through expert validation and CVR, internal reliability with Cronbach's alpha. Member checks are conducted by requesting participant feedback. A detailed description of the research context is provided for transferability. This strategy ensures accurate, credible, and reliable data, thereby increasing the validity and reliability of the research findings.

3. Result And Discussion

This study examined the effectiveness of gamification-based learning media in developing entrepreneurial attitudes among young children. Combining quantitative and qualitative data, it provides a deep understanding of the impact of contextually and interactively designed gamification media as a strategic tool in building the foundations of entrepreneurship.

3.1. Result

Instrument Validity and Reliability

The potential of gamification-based learning media as an effective tool for instilling entrepreneurial attitudes from an early age. Quantitative and qualitative data analysis provide strong evidence of the effectiveness of gamification-based learning media in improving children's knowledge, understanding, and attitudes about entrepreneurship. These findings support the research hypothesis and contribute to the development of effective entrepreneurial learning media for early childhood (Samodra et al., 2021). Before being used in the study, the entrepreneurial attitude questionnaire instrument was tested for validity and reliability. Content validation results by subject matter experts showed that the Content Validity Ratio (CVR) exceeded 0.99 for all items, indicating that this instrument has excellent content validity. The post-test average was higher than the pre-test in all indicators. The paired t-test results were significant ($p < 0.01$) → indicating a real difference after the intervention. The reliability of the instrument was high ($\alpha = 0.87$). In conclusion, gamification media is effective in improving children's entrepreneurial attitudes. To ensure the instrument was valid and reliable, a Content Validity test was conducted: verified by three experts (education, psychology, and entrepreneurship). All items were assessed as relevant (Aiken's $V > 0.80$). Internal Reliability (Cronbach's Alpha) $\alpha = 0.87$ → high category → reliable instrument indicates that the instrument used in this study is valid and reliable. This ensures that the findings of this study are trustworthy and reliable and can be considered consistent and reliable for measuring children's entrepreneurial attitudes.

Table 1. Reliability Statistics

Cronbach's Alpha	N of Item
0,87	15

3.2. Quantitative Result

The Effect of Gamification-Based Learning Media on Entrepreneurial Attitudes

Quantitative analysis results show a significant increase in children's entrepreneurial attitudes after the application of gamification media (Rodríguez et al., 2020). Descriptively, the average scores on all indicators increased

in the post-test stage compared to the pre-test. The average score in the pre-test phase was 65.20 (SD = 10.50), increasing to 78.50 (SD = 9.80) in the post-test phase. In terms of independence, the average score increased from 3.15 (SD = 0.62) to 4.02 (SD = 0.48). A similar pattern was observed in initiative, which increased from 2.98 (SD = 0.71) to 3.85 (SD = 0.55). Meanwhile, the largest increase occurred in the simple problem-solving indicator, from 3.05 (SD = 0.60) to 4.25 (SD = 0.50). This increase in average scores indicates that children tend to be more independent, able to take initiative, and more active in solving simple problems after the gamification-based learning intervention was implemented.

The results of the inferential test using a paired t-test further strengthen these findings. All three indicators showed a p-value < 0.01, which means there was a significant difference between the pre-test and post-test scores. In other words, learning using gamification media has a real impact on improving children's entrepreneurial attitudes. Among the three indicators, simple problem solving had the largest t value (t = 4.02; p = 0.001), indicating that this aspect was most strongly influenced by the application of gamification.

Statistical Significance Test: A paired t-test was conducted. The t-test results showed a significant difference between the pre-test and post-test scores (t = -8.50, df = 59, p < 0.001). This indicates that gamification-based learning media has a significant positive effect on children's entrepreneurial attitudes.

Table 2. Statistical Test Results of Children's Development Indicators

Indicator	Pre-Intervention (M ± SD)	Post-Intervention (M ± SD)	t	p/ Sig	N	Δ Mean	Remark
Independence	3.15 ± 0.62	4.02 ± 0.48	3.45	0.002	30	+0.87	Significant
Initiative	2.98 ± 0.71	3.85 ± 0.55	3.12	0.005	30	+0.87	Significant
Problem-Solving	3.05 ± 0.60	4.25 ± 0.50	4.02	0.001	30	+1.20	Significant

Table 2 shows a consistent improvement in all children's development indicators after the intervention. The independence score increased from 3.15 (SD = 0.62) to 4.02 (SD = 0.48), with a significant result (t = 3.45; p = 0.002) and a mean gain of +0.87, indicating children became more capable of completing tasks independently. Similarly, initiative improved from 2.98 (SD = 0.71) to 3.85 (SD = 0.55) (t = 3.12; p = 0.005), with a mean increase of +0.87, showing stronger willingness to start activities and participate actively. The largest gain occurred in problem-solving, rising from 3.05 (SD = 0.60) to 4.25 (SD = 0.50) (t = 4.02; p = 0.001), with a mean difference of +1.20, indicating notable growth in children's ability to think critically and find solutions.

The statistical test results show a significant increase in all entrepreneurship indicators, namely independence (p = 0.002), initiative-taking ability (p = 0.005), and involvement in problem solving (p = 0.001).

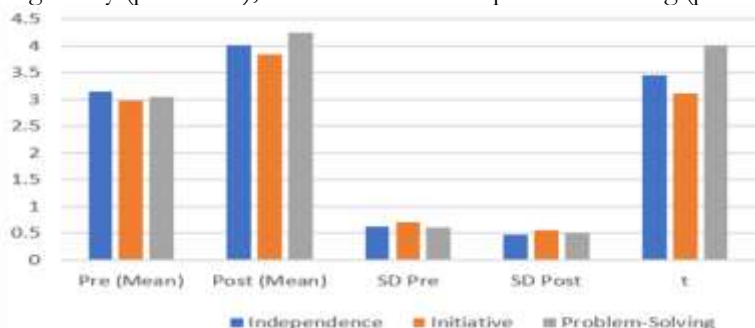


Figure 2. Statistical Test Results Graph

Figure 2 shows that the post-intervention mean scores for independence, initiative, and problem-solving are all higher than the pre-intervention scores. The graph also indicates more consistent performance after the program. These visual findings support the statistical results showing significant improvements in independence (p = 0.002), initiative (p = 0.005), and problem-solving (p = 0.001), confirming the effectiveness of the intervention in strengthening children's entrepreneurship skills.

The results of this study indicate that gamification-based learning media has a significant positive effect on the entrepreneurial attitudes of early childhood. The increase in entrepreneurial attitude scores from the pre-test phase to the post-test phase shows that this learning media is effective in improving children's understanding and interest in the concept of entrepreneurship. Statistical tests on each entrepreneurial indicator show a significant increase in independence, initiative-taking ability, and involvement in problem solving. This indicates that gamification-based learning media not only improves children's understanding of entrepreneurial concepts, but also develops the skills and attitudes that are important for becoming a successful entrepreneur in the future (Chojak, 2024).

3.3. Qualitative Results

Qualitative analysis was conducted through data triangulation from questionnaire, field observation notes, interviews, and open ended responses from expert validation. The data were analysed thematically to strengthen the validity of the findings. Observation results showed that children were enthusiastic and actively participated in

learning activities using gamification-based media. They showed strong interest in the learning content, were eager to complete the challenges provided, and demonstrated increased independence, initiative, and involvement in simple problem-solving activities.

Interview results with educators showed that gamification-based learning media were effective in increasing children's motivation to learn and provided positive stimuli in collaborative social interactions (Agung Wahyu et al., 2024). Children feel more encouraged to complete tasks independently and dare to take the initiative in finding answers. Educators reported that children were more willing to complete tasks independently, participate in group discussions, and engage in solving problems presented through game-based activities. Teachers also noted that the media helped present abstract entrepreneurial concepts in a more concrete and understandable way for young learners. One teacher stated, *"This gamification media really helps me explain the concept of saving so children can understand it more easily and feel motivated to save independently."* These findings consistently appeared across multiple data sources, including observations, interviews, and questionnaire responses, indicating a similar pattern of children's engagement, participation, and behavioural changes during the implementation of gamified learning activities.

4. Discussion

The findings of this study should be understood in relation to the initial needs analysis, which identified a clear gap between the needs of early childhood learners and the limited availability of effective entrepreneurship learning media. This gap became the foundation for developing gamification-based learning media designed with clear objectives, relevant content, engaging game elements, and developmentally appropriate visual design (Devendra & Sanjeev Shah, 2024; Marín-Díaz et al., 2020; Zizikova et al., 2023). The high feasibility score from expert validation (above 90%) confirms that the developed media meets pedagogical and developmental standards before being tested with children (Marinov & Spasova, 2023).

Effectiveness of Gamification Media in Fostering Entrepreneurial Attitudes

The integration of quantitative and qualitative findings provides strong evidence that gamified learning media can foster early entrepreneurial attitudes. Statistically significant improvements in independence, initiative, and problem-solving demonstrate that gamification can support key behavioural changes associated with entrepreneurial learning. These improvements are closely related to the role of gamification elements such as challenges, rewards, and feedback, which encourage children's active participation and sustained engagement in learning activities (Alya et al., 2025). The media also provided opportunities for children to experience simple entrepreneurial simulations, including resource management, decision-making, and teamwork, while social interaction during gameplay supported collaboration and communication skills (Simón & Vivaldo, 2022). Observations were conducted using a Likert scale (1–4) focusing on independence, initiative, and problem-solving indicators. Teachers and parents reported higher levels of engagement and intrinsic motivation when children interacted with the gamified learning media, transforming learning into a more enjoyable and stimulating activity (Grah et al., 2024; David & Weinstein, 2023). This suggests that gamified environments can support children's needs for autonomy, competence, and social interaction, which are essential for fostering active learning and persistence.

The improvement in children's independence and initiative also reflects the early development of entrepreneurial self-efficacy. Observational data indicated that children became more willing to explore solutions, collaborate with peers, and experiment with different approaches (Hoxha & Ramadani, 2024). In addition, the use of gamified media supported the development of a positive and collaborative learning environment characterised by mutual support, creative expression, and shared achievement (Gorai, 2024). Quantitative results confirmed a significant increase in entrepreneurial attitude scores from pre-test to post-test, while qualitative findings provided insights into children's engagement, initiative, and collaborative learning experiences (Kusdiyanti et al., 2022; Satria et al., 2024; Sabrina, 2022; Aries et al., 2020).). Importantly, this study extends prior research by showing that gamification can be applied to entrepreneurship education in early childhood, an area that has received limited empirical attention.

Contribution to Early Childhood Education Curriculum Development and Digital Learning Innovation

From a curriculum perspective, this study demonstrates that gamification-based entrepreneurship learning can function as a developmentally appropriate digital learning model that supports independence, creativity, and courage in young learners (Lestari et al., 2024). The findings provide empirical evidence of the potential of gamified learning media in supporting entrepreneurial learning in early childhood education. Despite these promising results, several limitations should be considered. The study involved a relatively small sample from three kindergartens and focused on short-term outcomes, which may limit generalisability. Future research should therefore involve larger and more diverse samples, conduct longitudinal studies, and examine the influence of specific gamification elements on entrepreneurial competencies (Casau et al., 2023; Mejía et al., 2024; Musyaffi et al., 2025).). Further studies may also explore the impact of gamification on more complex entrepreneurial skills such as negotiation, leadership, and financial literacy, as well as the role of parents and family environments in supporting early entrepreneurship education. The findings highlight the potential of integrating gamified learning media into early childhood curricula and emphasise the importance of teacher training and policy support for implementation (Olejniczak & Dębicka, 2020; Pujihastuti et al., 2022). Gamification shows strong potential to support the development of independent, creative, innovative, and adaptive future generations.

Overall, the results highlight the broad development potential of gamified learning media. With further refinement and wider implementation, gamification principles can be applied across various educational and entrepreneurship training contexts. The integration of gamification into early childhood education has the potential to support the development of independent, creative, innovative, and adaptive future generations capable of facing global economic challenges.

5. Conclusion

This research investigated the development and evaluation of gamified learning media's effectiveness in fostering entrepreneurial attitudes among young children. The findings demonstrate a significant positive impact of gamified learning on children's entrepreneurial attitudes, evidenced by improved overall attitude scores and enhanced capabilities across key indicators: independence, initiative, and problem-solving engagement. The results confirm gamification as an effective strategy for boosting children's learning motivation and cultivating essential skills for future entrepreneurial success. This effectiveness is reflected in children's increased engagement, active participation, and enthusiasm during learning activities, as well as their improved ability to demonstrate creativity, problem-solving, collaboration, and initiative. Contextually and interactively designed gamified learning media provide engaging and meaningful learning experiences, motivating children to learn about entrepreneurship and develop positive attitudes toward the business world. This research also offers crucial implications for designing entrepreneurship education for young children, particularly in integrating play-based, technology-supported, and developmentally appropriate learning approaches. Instructional design should consider gamification principles, such as providing appropriately challenging tasks, constructive feedback, and opportunities for peer collaboration. Furthermore, the design must be contextualized and relevant to children's daily lives, enabling seamless application of entrepreneurial concepts in real-world scenarios. Consistent with the initial hypotheses, this research successfully demonstrates gamified learning media as an effective solution to address gaps in early childhood entrepreneurship education. These findings significantly contribute to the development of more innovative and effective entrepreneurship education programs for the future, underscoring the potential of gamification in shaping the next generation of entrepreneurial thinkers. The implications of this research highlight the importance of integrating gamified learning into early childhood curricula, encouraging educators to adopt play-based and technology-supported approaches to foster creativity, problem-solving, collaboration, and initiative from an early age. Furthermore, this study provides practical guidance for curriculum developers, teachers, and policymakers in designing developmentally appropriate entrepreneurship learning experiences that are engaging, interactive, and relevant to the needs of young learners.

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