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Digital children's literature based on ecopreneurship to improve financial literacy and creative thinking

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Abstract

This study explores the integration of digital innovation and ecopreneurship-based children's literature as a means to enhance students' financial literacy and creative thinking skills. The accelerating advancement of digital technology creates new opportunities to embed eco-friendly entrepreneurial values within literary learning, fostering not only reading engagement but also critical, creative, and sustainability-oriented mindsets. By incorporating ecopreneurial principles, students are guided to understand fundamental financial concepts, manage resources responsibly, and generate innovative ideas with economic and ecological significance. The research findings reveal that interactive digital literary media significantly improve learning motivation, strengthen financial literacy, and stimulate students' creative thinking abilities. These results underscore the need for active collaboration among educators, institutions, and policymakers to promote the development of digital and ecopreneurship-based educational media as a strategic approach to nurturing a literate, innovative, and environmentally conscious generation.

Introduction

The advancement of digital technology has significantly reshaped how children engage with literary works, shifting reading experiences from traditional print to dynamic digital environments (Ozbay and Ugurelli, 2023; Spjeldnæs and Karlsen, 2024). Digital storytelling and literature, which combine text, audio, images, and video, create multimodal learning experiences that foster literacy development and stimulate creative expression. These innovations have proven to be powerful pedagogical tools, particularly within online and hybrid learning contexts (Eisazadeh and Rajendram, 2020; Kim and Li, 2021; Shahid and Khan, 2022). Concurrently, pressing global challenges, such as environmental degradation and the pursuit of sustainable development have led educators to incorporate environmental awareness and sustainable entrepreneurship, or ecopreneurship, into early education (Manning et al., 2020). Ecopreneurship goes beyond introducing business opportunities; it instills sustainability values, resource management awareness, and innovation in creating environmentally responsible products and services that are crucial for future generations. Previous studies indicate that when entrepreneurial education is contextually linked with environmental themes, children exhibit higher interest, engagement, and positive entrepreneurial attitudes.

Integrating digital children's literature with an ecopreneurship framework presents new pedagogical opportunities to teach financial literacy in engaging and meaningful ways (Rosário and Raimundo, 2024). Rather than relying solely on abstract financial concepts, stories can illustrate practical ecopreneurial experiences for instance, children designing eco-friendly products and learning to manage their sales. Through such narratives, students naturally grasp concepts such as saving, costs, pricing, and profit. Evidence from structured financial literacy programs and thematic reading initiatives further suggests that well-designed materials and activities can significantly enhance children's understanding of financial principles (Eshbach, 2020; Kiszl and Winkler, 2022; Read et al., 2022). Hence, the fusion of digital literature and ecopreneurship education offers a promising strategy to cultivate financially literate, creative, and environmentally conscious learners.

Moreover, digital media, when grounded in sound instructional design principles, holds significant potential to foster creative thinking skills (Aoonlamai and Kwangmuang, 2025). Learning environments that encourage exploration, multimodal production, collaboration, and reflection have been shown to stimulate students' imagination and problem-solving abilities (Kewalramani, 2022). Activities such as digital story writing, creating illustrations, recording narratives, and developing small-scale marketing campaigns for ecopreneurial products provide authentic contexts for students to practice divergent, associative, and visual thinking, key competencies for 21st-century creativity (Alatalo and Westlund, 2021).

In the Indonesian context, growing emphasis on digital literacy and sustainability education in both policy and research underscores the need for innovative learning models that merge digital literature, environmental awareness, and entrepreneurship education. Nevertheless, empirical studies investigating the integration of digital children's literature, ecopreneurship, financial literacy, and creative skill development remain scarce. In particular, limited attention has been given to evaluating the effectiveness of such integrative learning on students' financial literacy and creative thinking outcomes. This gap presents an opportunity for further research and the formulation of measurable intervention programs.

The proposed model of ecopreneurship-based digital children's literature offers a comprehensive learning package that integrates interactive digital storytelling, simple ecopreneurial projects, and child-friendly financial literacy modules. The central objective of this study is to examine the model's effectiveness in enhancing students' financial literacy and creative thinking, particularly among elementary and junior high school learners, while also assessing teachers' perceptions and implementation challenges within school

settings. This approach not only enriches pedagogical resources but also promotes sustainable entrepreneurial values from an early age, aligning with the Sustainable Development Goals (SDGs) on quality education and responsible consumption and production.

Literature Review

Recent studies highlight the pedagogical potential of digital storytelling and digital literature, which combine multiple modes text, image, audio, video, and interactivity to enrich children's engagement, comprehension, and communication skills (Barua, 2023; Bus, Bus, Neuman and Roskos, 2020; Djonov). Systematic reviews and empirical evidence from 2020 to 2025 consistently report improvements in literacy outcomes, affective engagement, and the construction of multimodal narratives when digital storytelling is designed with structured instructional principles. Effective design approaches emphasize accessibility, guided scaffolding, and creative production opportunities, positioning students as active creators rather than passive consumers. In this context, digital stories focusing on environmental issues can serve as powerful vehicles for embedding ecopreneurship values within literary experiences (Hager, Alzafari and Rashid, 2024).

The literature on ecopreneurship education has also expanded in recent years, reflecting growing attention to cultivating sustainable mindsets and eco-innovation among youth. Empirical studies from both Indonesian and global contexts show that early exposure to green entrepreneurship fosters proenvironmental attitudes and entrepreneurial intention, especially when delivered through contextual, project-based, and community-linked learning (Parker and Prabawa-Sear, 2020; Zain, Pribadi and Indraprahasta, 2022). Despite this progress, most research has focused on older students, leaving a significant gap in early education. Integrating ecopreneurship into children's literature through storylines that incorporate real-life tasks, such as creating eco-friendly products offers a promising approach to contextualizing financial and sustainability learning for younger learners.

Between 2020 and 2024, narrative reviews and applied studies identified several key components of effective financial literacy education: experiential learning (Shi, Ali and Leong, 2025), parental involvement (Ingale and Paluri, 2022), digital simulations (Platz and Jüttler, 2022), and curriculum integration (Hu and Raman, 2024). Technology-based tools such as educational applications, simulation games, and interactive modules have been shown to enhance learners' motivation and conceptual understanding particularly when paired with timely feedback and real-world applications (Hsu and Wu, 2023). Challenges persist, including unequal access, curriculum gaps, and socioeconomic disparities. Integrating financial literacy through ecopreneurial storytelling aligns well with experiential learning principles, enabling students to connect financial concepts with personal creativity and social responsibility (Thomsen, Muurlink and Best, 2021).

Research conducted between 2023 and 2025 further emphasizes the role of digital learning environments in stimulating creativity. Digital platforms that promote exploration (Aithal and Maiya, 2023), collaboration (Samper-Márquez and Oropesa-Ruiz, 2025), multimodal creation (Rahmanu and Molnár, 2024), and creative problem-solving (Adera, 2025) have been linked to the development of creative thinking skills. However, the success of such interventions depends heavily on teacher facilitation. Digital literature modules that focus on production such as writing, digital illustration, and marketing campaigns for ecopreneurial products represent a structured approach to nurturing creativity in young learners.

In Indonesia, ongoing digital transformation policies (2021–2024) and recent initiatives to strengthen digital literacy reflect strong policy support for technology integration in education. Moreover, organizations such as UNICEF advocate for sustainability-oriented curricula at the primary school level in various countries. Yet, disparities in infrastructure, teacher readiness, and contextual materials remain significant barriers to implementation. These challenges underscore the need for context-sensitive designs that consider local technological capacity and professional development. While prior research has demonstrated the individual potential of digital literature, ecopreneurship, financial literacy, and creativity, comprehensive empirical studies that integrate all four domains especially for primary school learners remain limited. Most existing studies continue to examine these areas separately, revealing a critical gap that this research aims to address.

Research Method

Research Design

This study uses a quantitative approach with an explanatory research design that aims to examine the causal relationship between latent variables, namely digital children's literature based on ecopreneurship, learning engagement, financial literacy, and the dimensions of creative thinking and environmental awareness. This study also examines the mediating role of learning engagement and financial

literacy in the relationship between digital children's literature based on ecopreneurship and creative thinking and environmental awareness. The approach used is Structural Equation Modeling (SEM) based on Partial Least Squares (PLS) because the research model is predictive, involves mediating variables, and is capable of analyzing complex models with many constructs and indicators. In addition, PLS-SEM is also suitable for use in theory development.

Sample and data collection

The respondents in this study were 363 elementary school students. These respondents were recruited using a random sampling method through the research team's community partners. Furthermore, our community partners serve as central locations for students pursuing elementary education. Demographic data was collected through initial documentation to identify students who used locally based culturally relevant teaching materials. Next, students were given quantitative measurements to identify digital children's literature based on ecopreneurship, learning engagement, financial literacy, and the dimensions of creative thinking and environmental awareness. Data were collected using a validated structured questionnaire.

Measurement scales and data analysis

Data analysis in this study used the Partial Least Squares Structural Equation Modeling (PLS-SEM) method with the help of SmartPLS 4 software. The analysis was carried out in two main stages: measurement model evaluation and structural model evaluation (Hair et al., 2022). Measurement model evaluation was carried out by testing convergent validity through outer loading values (> 0.70) and Average Variance Extracted (AVE) (> 0.50), and construct reliability through Composite Reliability and Cronbach's Alpha (> 0.70). Furthermore, discriminant validity was tested using the Heterotrait-Monotrait Ratio (HTMT) value (< 0.90) and cross-loading to ensure that the indicators have the highest correlation in their respective constructs. Structural model evaluation was carried out by looking at the R-square (R^2) value to measure the ability of exogenous variables to explain endogenous variables, and the path coefficient value to test the direction and strength of the relationship between variables. Hypothesis testing was conducted using bootstrapping procedures to examine T-statistics and P-values to determine the significance of direct and indirect (mediation) effects. Furthermore, the analysis also included testing the mediation effect to determine the role of learning engagement and financial literacy in strengthening the relationship between digital children's literature based on ecopreneurship and creative thinking and environmental awareness.

Ethical Consideration

This study was approved by the Ethics Committee of Research and Community Service Institute, Universitas Negeri Makassar (5895/UN36.11/TU/2025). The research was conducted in accordance wirh relevant ethical guidelines and regulations for research involving human participants. Infomed concent was obtained from all participants prior to their involvement in the study. Participants were informed about the purpose of the research, procedures, potential risks, and benefits. All participants also provide informed concent for participation and publication of anonymized data.

Results

Convergent validity

Table 1
Construct Reliability and Validity

Creative Thinking	**Composite reliability (rho_a)**
	0.816
Digital Children's Literature Based on Ecopreneurship	0.748
Environmental Awareness	0.777
Financial Literacy	0.849
Learning Engagement	0.784

The results of the construct reliability test indicate that all research variables have composite reliability (rho_a) values above the recommended minimum limit, which is 0.70. The reliability values for Creative Thinking (0.816), Digital Children's Literature Based on Ecopreneurship (0.748), Environmental Awareness (0.777), Financial Literacy (0.849), and Learning Engagement (0.784) indicate that all constructs have a good level of internal consistency. Thus, it can be concluded that all constructs in this research model are reliable and suitable for further analysis because they have met the reliability criteria in the PLS-SEM measurement model.

Table 2
Outer Loadings

CT1	Creative Thinking	Digital Children's Literature Based on Ecopreneurship	Environmental Awareness	Financial Literacy	Learning Engagement	Learning Engagement x Digital Children's Literature Based on Ecopreneurship	Environmental Awareness x Digital Children's Literature Based on Ecopreneurship
CT2	0.852						
CT3	0.792						
CT4	0.728						
CT5	0.832						
DLC1		0.753					
DLC2		0.808					
DLC3		0.832					
DLC4		0.897					
DLC5		0.792					
EA1			0.832				
EA2			0.837				
EA3			0.837				
EA4			0.792				
EA5			0.787				
FL1				0.728			
FL2				0.841			
FL3				0.797			
FL4				0.805			
FL5				0.753			
LE1					0.792		
LE2					0.792		
LE3					0.798		
LE4					0.809		
LE5					0.751		
Learning Engagement x Digital Children's Literature Based on Ecopreneurship						1.000	

CT1	Creative Thinking	Digital Children's Literature Based on Ecopreneurship	Environmental Awareness	Financial Literacy	Learning Engagement	Learning Engagement x Digital Children's Literature Based on Ecopreneurship	Environmental Awareness x Digital Children's Literature Based on Ecopreneurship
Environmental Awareness x Digital Children's Literature Based on Ecopreneurship							1.000

The results of the outer loadings test indicate that all indicators in each construct have loading factor values above the minimum limit of 0.70, thus they can be declared to meet the criteria of convergent validity. Indicators in the Creative Thinking variable have loading values between 0.728–0.852, Digital Children's Literature Based on Ecopreneurship between 0.753–0.897, Environmental Awareness between 0.787–0.837, Financial Literacy between 0.728–0.841, and Learning Engagement between 0.751–0.809. These values indicate that each indicator is able to reflect its construct well. In addition, the interaction variable (moderating effect) also shows a loading value of 1,000 which indicates that the interaction construct is perfectly formed in the model. Thus, it can be concluded that all research indicators are valid and suitable for use in further structural model analysis.

Discriminant Validity

Table 3
Discriminant Validity – Fornell-Larcker Criterion

Creative Thinking	Creative Thinking	Digital Children's Literature Based on Ecopreneurship	Environmental Awareness	Financial Literacy	Learning Engagement
	0.741				
Digital Children's Literature Based on Ecopreneurship	0.786	0.681			
Environmental Awareness	0.785	0.791	0.667		
Financial Literacy	0.830	0.801	0.807	0.786	
Learning Engagement	0.803	0.740	0.773	0.800	0.709

The results of the discriminant validity test using the Fornell–Larcker criteria indicate that most constructs have a relatively higher AVE square root value (diagonal value) compared to the correlations between other constructs, indicating the construct's ability to differentiate itself from other constructs in the model. The diagonal values of each construct are Creative Thinking (0.741), Digital Children's Literature Based on Ecopreneurship (0.681), Environmental Awareness (0.667), Financial Literacy (0.786), and Learning Engagement (0.709). However, there are several correlations between constructs whose values are higher than the diagonal value, such as the relationship between Digital Children's Literature Based on Ecopreneurship and Financial Literacy (0.801) and Environmental Awareness and Financial Literacy (0.807). This indicates that discriminant validity is not yet fully optimal and requires further attention, for example by evaluating indicators or additional testing such as HTMT to ensure that the model's discriminant validity has been adequately met.

Path Coefficient

Table 4
Path Coefficient

Digital Children's Literature Based on Ecopreneurship -> Creative Thinking	Path coefficients
	0.338
Digital Children's Literature Based on Ecopreneurship -> Environmental Awareness	0.791
Digital Children's Literature Based on Ecopreneurship -> Financial Literacy	0.323
Digital Children's Literature Based on Ecopreneurship -> Learning Engagement	0.740
Environmental Awareness -> Creative Thinking	0.263
Environmental Awareness -> Financial Literacy	0.290
Learning Engagement -> Creative Thinking	0.355
Learning Engagement -> Financial Literacy	0.329
Learning Engagement x Digital Children's Literature Based on Ecopreneurship -> Creative Thinking	0.042
Learning Engagement x Digital Children's Literature Based on Ecopreneurship -> Financial Literacy	0.039
Environmental Awareness x Digital Children's Literature Based on Ecopreneurship -> Creative Thinking	0.019
Environmental Awareness x Digital Children's Literature Based on Ecopreneurship -> Financial Literacy	-0.032

The path coefficient results show that Digital Children's Literature Based on Ecopreneurship has a positive influence on Creative Thinking (β = 0.338), Environmental Awareness (β = 0.791), Financial Literacy (β = 0.323), and Learning Engagement (β = 0.740), where the strongest influence is seen in Environmental Awareness and Learning Engagement. Furthermore, Environmental Awareness also has a positive influence on Creative Thinking (β = 0.263) and Financial Literacy (β = 0.290), while Learning Engagement shows a positive influence on Creative Thinking (β = 0.355) and Financial Literacy (β = 0.329). However, the interaction effect between Learning Engagement and Digital Children's Literature Based on Ecopreneurship on Creative Thinking (β = 0.042) and Financial Literacy (β = 0.039), as well as the interaction between Environmental Awareness and Digital Children's Literature Based on Ecopreneurship on Creative Thinking (β = 0.019) and Financial Literacy (β = -0.032) showed a very weak influence. In general, these results indicate that the direct influence of Digital Children's Literature Based on Ecopreneurship is more dominant than the moderating influence in explaining the increase in creative thinking and financial literacy.

Direct Mediation Test

Table 5
Direct mediation test

Digital Children's Literature Based on Ecopreneurship -> Creative Thinking	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
	0.338	**0.338**	**0.046**	**7.405**	**0.000**
Digital Children's Literature Based on Ecopreneurship -> Environmental Awareness	0.791	0.791	0.019	41.125	0.000
Digital Children's Literature Based on Ecopreneurship -> Financial Literacy	0.323	0.321	0.047	6.923	0.000
Digital Children's Literature Based on Ecopreneurship -> Learning Engagement	0.740	0.741	0.025	30.153	0.000
Environmental Awareness -> Creative Thinking	0.263	0.263	0.048	5.496	0.000
Environmental Awareness -> Financial Literacy	0.290	0.292	0.049	5.907	0.000
Learning Engagement -> Creative Thinking	0.355	0.356	0.044	8.062	0.000
Learning Engagement -> Financial Literacy	0.329	0.330	0.047	7.045	0.000
Learning Engagement x Digital Children's Literature Based on Ecopreneurship -> Creative Thinking	0.042	0.041	0.033	1.292	0.196
Learning Engagement x Digital Children's Literature Based on Ecopreneurship -> Financial Literacy	0.039	0.037	0.037	1.048	0.295
Environmental Awareness x Digital Children's Literature Based on Ecopreneurship -> Creative Thinking	0.019	0.020	0.031	0.613	0.540
Environmental Awareness x Digital Children's Literature Based on Ecopreneurship -> Financial Literacy	-0.032	-0.031	0.035	0.917	0.359

The test results show that Digital Children's Literature Based on Ecopreneurship has a positive and significant effect on Creative Thinking (β = 0.338; t = 7.405; p = 0.000), Environmental Awareness (β = 0.791; t = 41.125; p = 0.000), Financial Literacy (β = 0.323; t = 6.923; p = 0.000), and Learning Engagement (β = 0.740; t = 30.153; p = 0.000). In addition, Environmental Awareness is proven to have a positive and significant effect on Creative Thinking (β = 0.263; t = 5.496; p = 0.000) and Financial Literacy (β = 0.290; t = 5.907; p = 0.000). Learning Engagement also showed a positive and significant influence on Creative Thinking (β = 0.355; t = 8.062; p = 0.000) and Financial Literacy (β = 0.329; t = 7.045; p = 0.000). However, the interaction effect of Learning Engagement and Environmental Awareness in moderating the relationship between Digital Children's Literature Based on Ecopreneurship on Creative Thinking and Financial Literacy was not significant (p > 0.05). Thus, it can be concluded that the direct influence between variables in the model is proven to be significant, while the moderation effect does not show a significant influence.

Indirect Mediation Test

Table 6
Indirect mediation test

Digital Children's Literature Based on Ecopreneurship -> Environmental Awareness -> Creative Thinking	Original sample (O)	Sample means (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
	0.208	**0.208**	**0.038**	**5.470**	**0.000**
Digital Children's Literature Based on Ecopreneurship -> Environmental Awareness -> Financial Literacy	0.230	0.231	0.039	5.887	0.000
Digital Children's Literature Based on Ecopreneurship -> Learning Engagement -> Creative Thinking	0.262	0.264	0.034	7.700	0.000
Digital Children's Literature Based on Ecopreneurship -> Learning Engagement -> Financial Literacy	0.244	0.245	0.037	6.643	0.000

The results of the indirect mediation test (indirect effects) show that Digital Children's Literature Based on Ecopreneurship has a positive and significant indirect effect on Creative Thinking through Environmental Awareness (β = 0.208; t = 5.470; p = 0.000) and on Financial Literacy through Environmental Awareness (β = 0.230; t = 5.887; p = 0.000). In addition, Digital Children's Literature Based on Ecopreneurship is also proven to have a positive and significant indirect effect on Creative Thinking through Learning Engagement (β = 0.262; t = 7.700; p = 0.000) and on Financial Literacy through Learning Engagement (β = 0.244; t = 6.643; p = 0.000). These results indicate that Environmental Awareness and Learning Engagement act as significant mediator variables in strengthening the influence of Digital Children's Literature Based on Ecopreneurship on Creative Thinking and Financial Literacy, so it can be concluded that the mediation effect in this research model is proven to be significant.

Full Structural Model

Source: Data processed using Smart PLS 4 software

Hypothesis Test Results

Ecopreneurship-based digital children's literature has a positive effect on learning engagement (H1). Results supported (H1 is accepted) with a path coefficient of β = 0.740, indicating a strong positive effect. This means that the better the implementation of ecopreneurship-based digital children's literature, the higher the students' learning engagement. Ecopreneurship-based digital children's literature has a positive effect on environmental awareness (H2). Results supported (H2 is accepted) with a coefficient of β = 0.791, indicating a strong positive effect on environmental awareness.

Learning engagement mediates the relationship between ecopreneurship-based digital children's literature and financial literacy (H3). Results not strongly supported (H3 is rejected) because the effect of learning engagement on financial literacy is very weak (β = 0.039), thus not indicating a significant mediation effect. Environmental awareness mediates the relationship between ecopreneurship-based digital children's literature and financial literacy (H4). Results not supported (H4 rejected) because the effect of environmental awareness on financial literacy was very small and negative (β = -0.032).

Learning engagement mediates the relationship between ecopreneurship-based digital children's literature and creative thinking (H5). Results not strongly supported (H5 rejected) because the effect of learning engagement on creative thinking was very weak (β = 0.042). Environmental awareness mediates the relationship between ecopreneurship-based digital children's literature and creative thinking. Results not supported (H6 rejected) because the effect of environmental awareness on creative thinking was very small (β = 0.019). Ecopreneurship-based digital children's literature was shown to have a direct effect on learning engagement and environmental awareness, but the mediating effect of learning engagement and environmental awareness on financial literacy and creative thinking was not significant.

Discussion

The evaluation of the measurement model confirms that all constructs in this study demonstrate adequate reliability and convergent validity. The composite reliability (rho_a) values for creative thinking (0.816), digital children’s literature based on ecopreneurship (0.748), environmental awareness (0.777), financial literacy (0.849), and learning engagement (0.784) all exceed the recommended

threshold of 0.70, indicating a high level of internal consistency among the indicators. In addition, all outer loading values are above 0.70, which suggests that each indicator significantly contributes to explaining its respective latent construct. These findings provide strong evidence that the measurement model is reliable and that the constructs are well operationalized. Consequently, the model satisfies the requirements for convergent validity and can be considered appropriate for further structural model evaluation.

Despite these satisfactory results, the assessment of discriminant validity using the Fornell–Larcker criterion reveals some limitations. While most constructs exhibit acceptable discriminant validity, as indicated by the square root of the average variance extracted (AVE) being greater than the inter-construct correlations, several exceptions are observed. In particular, the correlations between digital children's literature based on ecopreneurship and financial literacy, as well as between environmental awareness and financial literacy, exceed the corresponding diagonal values. This suggests that these constructs may not be sufficiently distinct from one another. Such overlap can be explained by the conceptual proximity between ecopreneurship, environmental awareness, and financial literacy, especially in educational contexts where sustainability and economic understanding are integrated into a single learning framework (Haldar, 2025; Oliviera et al., 2025; Le Loarne Lemaire et al., 2022). Nevertheless, these findings indicate the need for further validation using more rigorous techniques, such as the heterotrait–monotrait ratio (HTMT), and possibly revisiting the measurement items to ensure clearer construct differentiation.

The structural model analysis provides substantial insights into the relationships among the studied variables. The results indicate that Digital Children's Literature Based on Ecopreneurship has a positive and statistically significant effect on creative thinking, environmental awareness, financial literacy, and learning engagement. Among these, the strongest effects are observed on environmental awareness ($\beta = 0.791$) and Learning Engagement ($\beta = 0.740$), highlighting the effectiveness of ecopreneurship-based digital learning materials in fostering students' environmental consciousness and active participation in learning activities. This finding suggests that integrating ecological and entrepreneurial values into children's digital literature can serve as a powerful pedagogical tool to enhance both affective and behavioral learning outcomes.

These findings are consistent with prior research emphasizing the role of integrated sustainability education in shaping students' environmental attitudes and behaviors. Embedding ecological values within educational content can significantly enhance learners' environmental awareness and responsibility (Aldawsari, Nemt-allah, M. A. and Abdellatif, 2025; Sarid and Goldman, 2021). Furthermore, the strong effect on learning engagement aligns with the view, who conceptualize engagement as a multidimensional construct influenced by meaningful and contextually relevant learning materials (Xu et al., 2023; Wong and Liem 2022; Wang and Hofkens, 2020). Learners are more actively engaged when instructional materials are relevant to real-world contexts and allow them to construct their own understanding through meaningful experiences (Lowell and Moore, 2020; O'Neill, G. and Short, 2025).

Furthermore, environmental awareness and learning engagement are found to have significant positive effects on creative thinking and financial literacy. This indicates that students who are more environmentally aware and actively engaged in the learning process are more likely to develop higher-order thinking skills and practical financial competencies (Lu et al., 2021; Wang and Liu, 2024). These results align with constructivist learning theories, which emphasize the importance of active participation and meaningful engagement in knowledge construction (Lee et al., 2024). The findings also suggest that environmental awareness not only contributes to pro-environmental attitudes but also supports cognitive development and decision-making skills related to financial literacy.

However, the moderating effects examined in this study do not yield significant results. The interaction terms involving learning engagement and environmental awareness in moderating the relationship between digital children's literature based on ecopreneurship and both creative thinking and financial literacy show very small and statistically insignificant coefficients. This indicates that these variables do not strengthen or weaken the direct relationships in the model. One possible explanation is that learning engagement and environmental awareness function more as direct predictors or mediating variables rather than as contextual factors that alter the strength of relationships (Manoj et al., 2020; Guo et al., 2022; Yoon, Kim, and Kang, 2020; Bala et al., 2023). Additionally, the lack of significant moderation effects may suggest that the impact of ecopreneurship-based digital literature is relatively stable across different levels of engagement and awareness.

In contrast, the mediation analysis reveals that both environmental awareness and learning engagement play significant intermediary roles in the model. The indirect effects of digital children's literature based on ecopreneurship on creative thinking and financial literacy through these variables are positive and statistically significant. This finding indicates that the influence of ecopreneurship-based learning materials is partially transmitted through increased environmental awareness and enhanced student engagement (Afum et al., 2024). In other words, these variables act as important psychological and behavioral mechanisms that facilitate the transformation of instructional inputs into meaningful learning outcomes. The presence of significant mediation effects underscores the importance of

incorporating process-oriented variables in educational research, as they provide a deeper understanding of how and why certain interventions are effective.

Taken together, the results of this study highlight the critical role of ecopreneurship-based digital children's literature in promoting essential 21st-century competencies, including creativity, environmental awareness, financial literacy, and learning engagement (Gunawan et al., 2025). The dominance of direct effects suggests that the instructional approach itself has a strong and immediate impact on student outcomes. At the same time, the significant mediation effects demonstrate that internal learning processes further enhance these outcomes. However, the absence of significant moderating effects indicates that future research should explore alternative moderating variables, such as individual differences, technological readiness, or instructional design factors, to better understand potential boundary conditions of the model.

Conclusion

The integration of digital innovation in children's literature through an ecopreneurship-based approach represents a creative and holistic effort to combine literacy development, creative expression, and environmental consciousness within an engaging learning framework. By presenting interactive digital narratives enriched with eco-conscious entrepreneurial values, students are not only introduced to fundamental concepts of financial literacy but are also guided to cultivate responsible resource management and sustainable thinking habits.

Moreover, incorporating an ecopreneurial perspective into digital literature strengthens students' creative thinking abilities by encouraging them to identify problems, generate original ideas, and design solutions that embody both economic and ecological significance. This learning model resonates strongly with the core competencies of 21st-century education, which emphasize digital literacy, innovation, and adaptability in facing technological and social transformations. Consequently, ecopreneurship-based digital children's literature serves as a strategic educational innovation, one that not only enhances learning quality but also contributes to shaping a generation that is financially literate, creatively empowered, and environmentally responsible.

Implications

For educators, the ability to design and implement interactive digital literary media that embed ecopreneurship values is crucial in promoting meaningful and contextual learning. In this capacity, teachers serve not merely as knowledge transmitters but as facilitators who guide students to link classroom learning with practical experiences particularly in areas of simple financial management and environmental responsibility. For schools and educational institutions, integrating ecopreneurship-based digital children's literature into thematic learning or student profile development projects can enhance the relevance of instruction. To maximize its effectiveness, schools must also ensure adequate technological infrastructure and provide ongoing professional development for teachers.

For students, the presence of engaging and interactive digital media can heighten learning motivation and participation, as it aligns closely with their digital habits and interests. Through such engagement, students can refine their creative thinking, strengthen financial literacy, and develop a deeper awareness of sustainable living. At the policy level, governments and education authorities are encouraged to foster this innovation through strategic initiatives such as policy reforms, funding for research and digital content development, and partnerships with creative industries. These efforts collectively contribute to advancing the Sustainable Development Goals (SDGs), especially in promoting quality education, encouraging innovation, and supporting sustainable consumption and production practices.

Declarations

Funding Declaration

This research is a grant program from the Directorate of Research and Community Service, Ministry of Higher Education, Science and Technology.

The research was conducted in accordance wirh relevant ethical guidelines and regulations for research involving human participants. Infomed concent was obtained from all participants prior to their involvement in the study. Participants were informed about the purpose of the research, procedures, potential risks, and benefits. All participants also provide informed concent for participation and publication of anonymized data.

Author Contribution

A,B wrote the main manuscript textC data analyzing

Data Availability

The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

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Figures

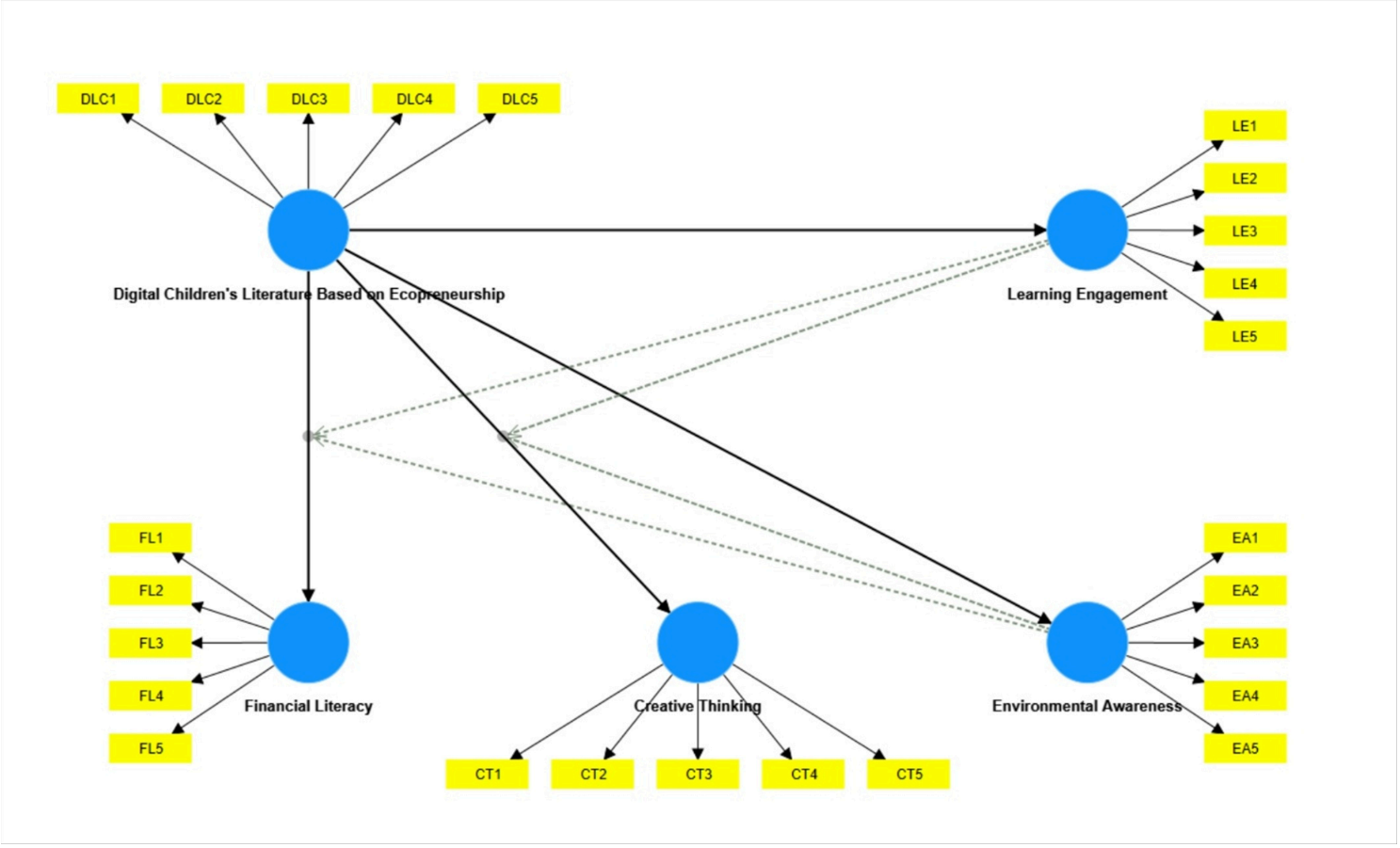


Figure 1

Conceptual model (Author own work)

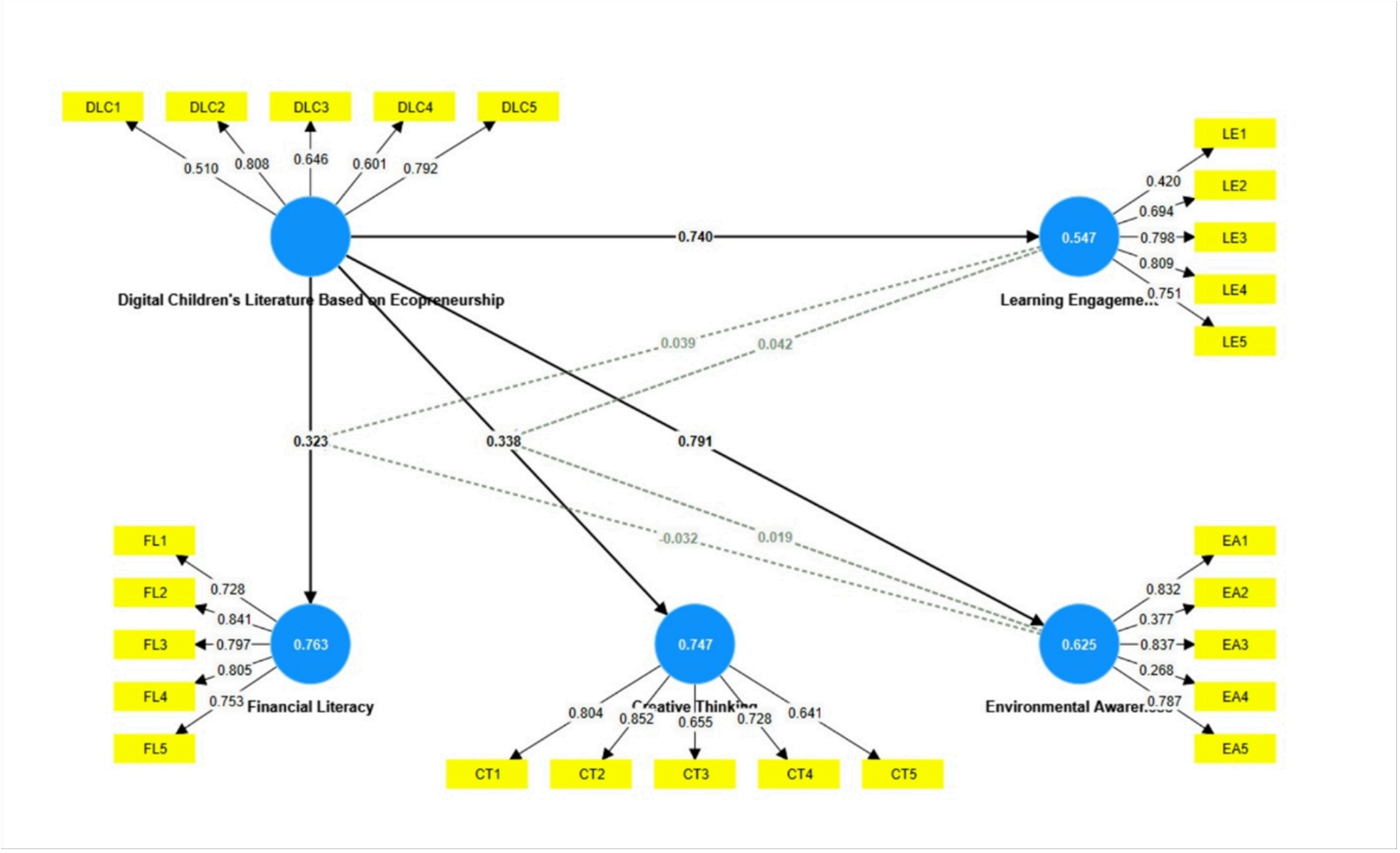


Figure 2

Path Analysis Result

Source: Data processed using Smart PLS 4 software