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ORIGINAL

Building the next generation of digital entrepreneurs: Lessons from indonesian vocational students

Construyendo la Próxima Generación de Emprendedores Digitales: Lecciones de Estudiantes de Formación Profesional en Indonesia

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ABSTRACT

Introduction: entrepreneurship education is increasingly recognized as a critical factor in shaping students' intentions to pursue digital entrepreneurial careers. However, the mechanism through which this education influences students' digital entrepreneurial intention, particularly through entrepreneurial attitude, remains underexplored in the context of vocational education in Indonesia.
Method: this study employed a quantitative approach using Partial Least Squares-Structural Equation Modeling (PLS-SEM) to examine the impact of entrepreneurship education on students' digital entrepreneurial intention, mediated by entrepreneurial attitude. Data were collected through an online survey from 350 students at vocational schools in Indonesia. Measurement and structural models were evaluated to test reliability, validity, and hypothesized relationships.
Results: the analysis confirmed that entrepreneurship education has a significant and positive effect on both entrepreneurial attitude and digital entrepreneurial intention. Furthermore, entrepreneurial attitude was found to play a substantial mediating role in the relationship between entrepreneurship education and digital entrepreneurial intention. The model demonstrated strong predictive relevance, with R^2 values of 0,572 and 0,789 for entrepreneurial attitude and digital entrepreneurial intention, respectively.
Conclusions: this study highlights the pivotal role of entrepreneurial attitude in enhancing the effectiveness of entrepreneurship education on students' digital entrepreneurial aspirations. Strengthening entrepreneurship education programs and integrating attitude-shaping components can foster stronger digital entrepreneurial intentions among vocational students. Future efforts should focus on improving educator competencies and expanding research to broader educational contexts across Indonesia.

Keywords: Entrepreneurship Education; Entrepreneurial Attitude; Digital Entrepreneurial Intention; Vocational Education; PLS-SEM.

RESUMEN

Introducción: la educación en emprendimiento es cada vez más reconocida como un factor clave en la formación de la intención de los estudiantes de seguir carreras emprendedoras digitales. Sin embargo, el mecanismo mediante el cual esta educación influye en la intención emprendedora digital de los estudiantes,

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particularmente a través de la actitud emprendedora, sigue estando poco explorado en el contexto de la educación vocacional en Indonesia.
Método: este estudio utilizó un enfoque cuantitativo mediante el Modelo de Ecuaciones Estructurales con Mínimos Cuadrados Parciales (PLS-SEM) para examinar el impacto de la educación en emprendimiento sobre la intención emprendedora digital de los estudiantes, mediado por la actitud emprendedora. Los datos se recopilaron mediante una encuesta en línea aplicada a 350 estudiantes de escuelas vocacionales Indonesia. Se evaluaron los modelos de medición y estructurales para comprobar su fiabilidad, validez y las relaciones hipotetizadas.
Resultados: el análisis confirmó que la educación en emprendimiento afecta de manera significativa y positiva tanto a la actitud emprendedora como a la intención emprendedora digital. Además, se encontró que la actitud emprendedora desempeña un papel mediador importante en la relación entre la educación en emprendimiento y la intención emprendedora digital. El modelo demostró una alta relevancia predictiva, con valores de R^2 de 0,572 para la actitud emprendedora y 0,789 para la intención emprendedora digital.
Conclusiones: este estudio resalta el papel fundamental de la actitud emprendedora en la mejora de la efectividad de la educación en emprendimiento sobre las aspiraciones digitales de los estudiantes. Fortalecer los programas de educación en emprendimiento e integrar componentes que moldeen la actitud puede fomentar intenciones emprendedoras digitales más fuertes entre los estudiantes vocacionales. Los esfuerzos futuros deben centrarse en mejorar las competencias del profesorado y ampliar la investigación a contextos educativos más amplios en toda Indonesia.

Palabras clave: Educación en Emprendimiento; Actitud Emprendedora; Intención Emprendedora Digital; Educación Vocacional; PLS-SEM.

INTRODUCTION

Entrepreneurship has long been recognized as a key driver of innovation, job creation, and economic growth. Both developed and emerging nations increasingly rely on entrepreneurial activities to enhance social welfare and reduce unemployment. Scholars argue that fostering entrepreneurial behavior contributes not only to the expansion of business opportunities but also to broader economic resilience in the face of global challenges.[1,2] Indonesia, as one of the largest emerging economies, also acknowledges the importance of entrepreneurship in strengthening its human capital and achieving sustainable development.[3] However, despite the nation's demographic advantage and government-led initiatives, the level of entrepreneurial participation in Indonesia remains relatively low. According to the 2018 Global Entrepreneurship Index, Indonesia ranked 95th out of 138 surveyed countries, far behind its Southeast Asian neighbors such as Singapore, Malaysia, and Vietnam. This low ranking underscores the structural challenges the country faces in building a competitive entrepreneurial ecosystem.

In response, the Indonesian government has sought to reinforce entrepreneurship education, particularly at the vocational level.[4] Vocational schools are strategically positioned to prepare young people not only for employment but also for self-employment through entrepreneurial ventures. A revision of the national curriculum has integrated entrepreneurship education with the expectation that it will foster entrepreneurial skills and aspirations among students. Yet, the reality has been less encouraging. Data reveal that the unemployment rate among vocational school graduates (9,42 %) is higher than that of senior high school (8,57 %) and university graduates (4,80 %). This persistent gap suggests that entrepreneurship education in vocational schools has not yet translated into meaningful outcomes for graduates.[5,6,7] One possible explanation lies in the limited emphasis on shaping students' entrepreneurial attitude, which is widely acknowledged as a critical determinant of entrepreneurial behavior.[8,9]

Prior studies in Indonesia and elsewhere have examined numerous factors influencing entrepreneurial intention, ranging from demographic and psychological to contextual determinants.[10,11] For instance, gender and cultural background have been shown to shape entrepreneurial aspirations.[12,13] Other research emphasizes the importance of family environment, social support, and entrepreneurial self-efficacy in driving entrepreneurial choices.[14,15] Work experience also plays a notable role, as students with prior exposure to business-related activities demonstrate stronger entrepreneurial intentions.[16] More recent studies focusing on digital-native generations highlight the influence of technological familiarity and motivational drivers in shaping career decisions, particularly in the hospitality and tourism sectors.[17,18] Collectively, this body of work highlights the multifaceted nature of entrepreneurial intention. However, there is still a notable gap: insufficient attention has been paid to the role of entrepreneurial attitude as a mediator between entrepreneurship education and entrepreneurial intention, especially in the context of digital entrepreneurship.

The growing relevance of digital entrepreneurship further accentuates this gap. Digital entrepreneurship,

characterized by the use of electronic platforms, digital technologies, and online communication channels, has become increasingly vital in today's economy.[19,20,21] Compared with traditional entrepreneurship, digital ventures demand distinct competencies such as platform literacy, data-driven decision-making, and virtual stakeholder engagement.[22] Scholars have noted that entrepreneurship education programs, both globally and in Indonesia, often fail to adequately integrate these digital-specific dimensions.[22,23] This misalignment risks leaving vocational graduates unprepared for the demands of a digitalized economy. Therefore, examining how entrepreneurship education influences students' digital entrepreneurial intention—particularly through the development of a positive entrepreneurial attitude—constitutes a pressing research priority.

A robust theoretical foundation is needed to explore these issues. The Theory of Planned Behavior (TPB) [24] provides such a framework. TPB posits that intention to perform a behavior is determined by three antecedents: (1) attitude toward the behavior, (2) subjective norms, and (3) perceived behavioral control. In the entrepreneurial context, attitude toward entrepreneurship reflects the individual's positive or negative evaluation of starting a business, which directly predicts entrepreneurial intention[25,26]. Unlike the more abstract notion of entrepreneurial mindset, which is often loosely defined and inconsistently applied in the literature, entrepreneurial attitude in TPB has a clear and measurable position. It captures cognitive and affective evaluations—such as perceiving entrepreneurship as desirable, rewarding, and achievable—that guide intention and behavior. Several studies confirm the explanatory power of TPB in entrepreneurial research, with attitude consistently emerging as the strongest predictor of entrepreneurial intention.[27,28]

The role of education in shaping entrepreneurial attitude is well-documented. Entrepreneurship education can provide students with knowledge, competencies, and experiential learning opportunities that reshape their evaluation of entrepreneurship as a viable career path.[29,30,31] For vocational students, who are at a critical transition stage between school and work, structured exposure to entrepreneurship education may significantly influence whether they view entrepreneurship—especially digital entrepreneurship—as feasible and attractive . Furthermore, educational interventions have the potential to strengthen opportunity recognition, creative problem-solving, and resilience, all of which underpin a positive entrepreneurial attitude. In turn, a stronger entrepreneurial attitude can lead to higher digital entrepreneurial intention, creating a pathway through which entrepreneurship education translates into actual entrepreneurial aspirations.[32,33,34]

Despite these theoretical insights, empirical research on the mediating role of entrepreneurial attitude in the relationship between entrepreneurship education and digital entrepreneurial intention remains limited, particularly in emerging economy contexts. Most prior studies have focused on higher education students, leaving vocational students underrepresented in the literature. Moreover, few studies explicitly examine digital entrepreneurship, despite its growing importance in the labor market. This study seeks to address these gaps by focusing on vocational students in Indonesia. By doing so, it responds to recent calls for more context-specific and domain-specific investigations into entrepreneurial intention.

In line with this rationale, the present study sets out to examine how entrepreneurship education influences digital entrepreneurial intention among vocational students, with entrepreneurial attitude serving as a mediating factor. Drawing upon the Theory of Planned Behavior, we propose that entrepreneurship education positively shapes students' entrepreneurial attitude, which in turn enhances their intention to pursue digital entrepreneurship. Specifically, the study tests the following hypotheses:

1. Entrepreneurship education has a positive effect on students' entrepreneurial attitude.
2. Entrepreneurship education has a positive effect on digital entrepreneurial intention.
3. Entrepreneurial attitude has a positive effect on digital entrepreneurial intention.
4. Entrepreneurial attitude mediates the relationship between entrepreneurship education and digital entrepreneurial intention.

By empirically testing these hypotheses, the study contributes to both theory and practice. Theoretically, it enriches the application of TPB in the domain of digital entrepreneurship and clarifies the role of entrepreneurial attitude as a central mechanism. Practically, the findings provide evidence-based insights for policymakers and educators to strengthen entrepreneurship curricula in vocational schools, ensuring that they better align with the competencies required in the digital economy. Ultimately, improving entrepreneurship education in this way may help reduce unemployment among vocational graduates and foster a new generation of digital entrepreneurs in Indonesia.

METHOD

Study Design, Setting, and Sample

This study employed a quantitative, cross-sectional survey design analyzed using Partial Least Squares-Structural Equation Modeling (PLS-SEM) to examine the causal relationships among entrepreneurship education, entrepreneurial attitude, and digital entrepreneurial intention. The research was conducted in vocational schools across Indonesia, between July and December 2024.

The study population comprised vocational students aged 15–18 years who were actively enrolled during the study period and had access to ICT devices to participate in the online survey. Inclusion criteria included students within the specified age range and enrollment status, while exclusion criteria were students outside the age range, not currently enrolled, or providing incomplete responses.

A total of 376 responses were collected, of which 350 valid questionnaires were retained for analysis after data screening. The participants were recruited using a convenience sampling method. Specifically, school administrators and entrepreneurship teachers were contacted by the research team and asked to share the online survey link with their students through classroom WhatsApp groups, email lists, and school learning platforms. Participation was voluntary, and students could access the questionnaire at their own convenience. Table 1 presents the demographic characteristics of the participants, including age, gender, field of study, and ICT usage duration.

While convenience sampling is widely applied in entrepreneurship education research, it has inherent limitations: the sample may not be fully representative of the broader population of Indonesian vocational students, and findings cannot be generalized with the same level of confidence as those obtained from probability-based sampling. To mitigate these weaknesses, we ensured a sufficiently large sample size that exceeds the minimum recommended thresholds for PLS-SEM analysis, thereby enhancing statistical power and robustness of the results.

The variables studied were: (1) Independent variable: Entrepreneurship education (6 items). (2) Mediating variable: Entrepreneurial attitude (7 items). (3) Dependent variable: Digital entrepreneurial intention (7 items). he theoretical framework guiding this study is shown in figure 1."

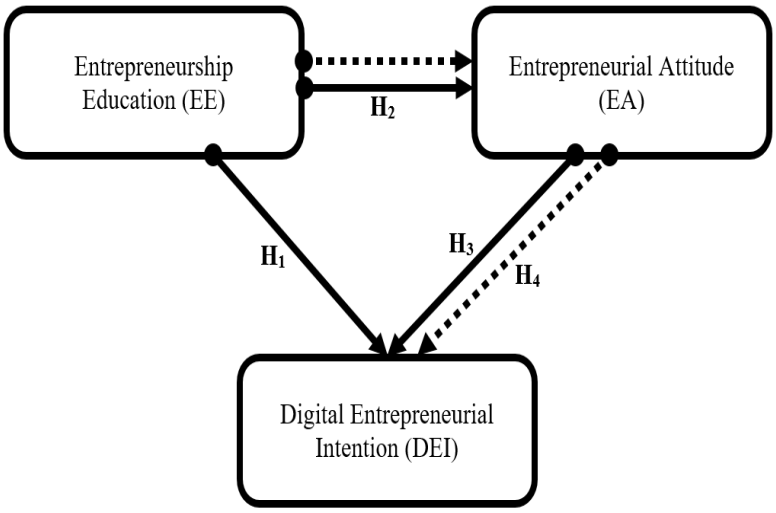

Figure 1. The theoretical framework

Data Collection Methods and Instruments

Data were collected using a structured online questionnaire distributed to participants. The items for entrepreneurship education, entrepreneurial attitude, and digital entrepreneurial intention were adapted from validated instruments in previous studies, measured on a 7-point Likert scale ranging from 1 ("strongly disagree") to 7 ("strongly agree"). Demographic information was also collected, including age, gender, field of study, and duration of ICT use.

Statistical Techniques and Procedures

Data analysis was conducted using PLS-SEM. The evaluation followed two stages: (1) Measurement model assessment (convergent validity, discriminant validity, composite reliability, and Cronbach's alpha). (2) Structural model assessment (path coefficients, R^2, f^2 effect size, Q^2 predictive relevance, and bootstrapping for hypothesis testing). A confidence level of 95 % ($p < 0,05$) was applied to determine statistical significance.

Ethical Considerations

Participation in the study was voluntary, and informed consent was obtained from all respondents before filling out the survey. The survey guaranteed anonymity and confidentiality, with no personal identifiers collected. The research complied with general ethical standards for educational research and received approval from the institutional ethics committee.

Table 1. Participant's demographic information

Aspect		Total	Percentage
Age	15	98	28,0 %
	16	159	45,4 %
	17	83	23,7 %
	18	10	2,9 %
Gender	Male	204	58,3 %
	Female	146	41,7 %
Major/Expertise	Manufacturing and engineering	97	27,7 %
	Information technology	94	26,9 %
	Arts and creative economy	48	13,7 %
	Business and management	57	16,3 %
	Maritime	54	15,4 %
ICT time of use	Less than 1 year	116	33,1 %
	1-2 years	124	35,4 %
	3-4 years	65	18,6 %
	5 years or older	45	12,9 %

RESULTS

Table 2. Outer model measurement results

Construct	Item	Descriptions	Loading (>0,5)	CA (>0,7)	CR (>0,7)	AVE (>0,5)
Entrepreneurship Education (EE)	EE1	I think that providing entrepreneurial teaching in school inspires students to pursue entrepreneurship.	0,871	0,928	0,942	0,744
	EE2	In my view, educational activities have the potential to expand opportunities for entrepreneurship.	0,855			
	EE3	Entrepreneurship is integrated into educational activities, creating opportunities for students to start their businesses.	0,893			
	EE4	Education in school cultivates skills and abilities that are relevant to entrepreneurship.	0,862			
	EE5	The classroom learning model imparts the necessary knowledge for entrepreneurship.	0,891			
	EE6	In a formal setting, the entrepreneurship education model encourages the generation of creative ideas.	0,858			
Entrepreneurial Attitude (EA)	EA1	I have debated the advantages of involving myself in entrepreneurial activities.	0,822	0,796	0,886	0,781
	EA2	I have chosen ideas for potential business opportunities in entrepreneurship.	0,838			
	EA3	I have assessed both the opportunities and challenges associated with entrepreneurship.	0,826			
	EA4	I have considered the financial prospects of getting involved in entrepreneurship.	0,798			
	EA5	I have considered the allocation of time for entrepreneurial affairs.	0,855			
	EA6	I have considered the potential positive and negative reactions associated with engaging in entrepreneurship.	0,838			
Digital Entrepreneurial Intention (DEI)	DEI1	I am prepared to do whatever it takes to become a successful digital entrepreneur.	0,777	0,824	0,914	0,712
	DEI2	I have given serious consideration to launching a digital business.	0,824			
	DEI3	I am committed to establishing my digital business, despite the obstacles that may arise.	0,865			
	DEI4	I plan to launch a digital business within the next five years.	0,873			
	DEI5	My ultimate goal is to become a digital entrepreneur.	0,891			
	DEI6	I am willing to put forth my best effort to become a digital entrepreneur shortly.	0,901			

Notes: CA=cronbach's alpha, CR=composite reliability, AVE=average variance extracted.

Outer Model Analysis

The initial step involved assessing the external model against four standards: discriminant validity, convergent validity, construct reliability, and composite reliability. The findings of this analysis are presented

in table 2. The data displayed in table 2 reveal that each variable, namely entrepreneurship education (EE), entrepreneurial attitude (EA), and digital entrepreneurial intention (DEI), has loading scores ranging from 0,777 to 0,901. These findings indicate that the variables have fulfilled the standard for convergent validity (loading factor greater than or equal to 0,70). Moreover, table 2 exhibits that the variance extracted (AVE) score for each construct surpassed 0,5, demonstrating that the criteria for discriminant validity have been met by these variables.

Table 2 shows that the composite reliability formula is every variable meets the criteria for satisfaction, including entrepreneurship education, entrepreneurial attitude, and digital entrepreneurial intention, with CR values of 0,942, 0,886, and 0,914. Similarly, the CA values for entrepreneurship education, entrepreneurial attitude, and digital entrepreneurial intention were 0,928, 0,796, and 0,824 (respectively), confirming their composite reliability. Moreover, the AVE scores for the variables range from 0,712 to 0,781 (all exceeding the 0,50 threshold), demonstrating that they have passed the discriminant validity test. Table 3 provides additional evidence for the discriminant calculation by demonstrating that the cross-loading value for entrepreneurship education, entrepreneurial attitude, and digital entrepreneurial intention exceeds 0,70, indicating that these variables satisfy the requirement for convergent validity. The heterotrait-monotrait ratio (HTMT) method was used to evaluate discriminant validity. Table 3 displays the results of the assessment for each variable, which reveal that the heterotrait-monotrait proportion is less than 0,90, indicating that the variables have satisfied the discriminant validity ideals.

Table 3. Discriminant validity and heterotrait-monotrait ratio

	EE	EA	DEI
Discriminant validity			
EE	0,791		
EA	0,723	0,724	
DEI	0,781	0,733	0,801
Heterotrait-monotrait ratio			
EE			
EA	0,854		0,723
DEI	0,797		

Inner Model Analysis

After completing the evaluation of the outer model, the structural model was evaluated by assessing the inner model. The assessment involved five phases of testing, which included examining collinearity, path coefficient, R-Square level, effect size, and relevant predictions (Q^2). The collinearity assessment is performed to determine the presence of high collinearity between variables. In this test, the Variance Inflation Factor (VIF) amount is analyzed with the condition that the VIF value must not exceed 5,00. According to the calculations, all variables under study had VIF coefficients ranging from 2,344 to 3,261, which is below 5,00, indicating the absence of collinearity for the construct. Consequently, all gauges tested for the constructs are considered effective.

The R-Square (R^2) test is conducted to assess the model's ability to accurately predict outcomes using the latent variable. The R^2 value reflects the level of prediction accuracy, with values of 0,19, 0,33, and 0,67 representing a weak, moderate, and strong model. In this study, the R-square value for the entrepreneurial attitude variable is 0,572, 57,2 percent of the variance in entrepreneurial attitude can be moderately predicted by the entrepreneurship education variable. Additionally, the digital entrepreneurial intention variable's R^2 value is 0,789, indicating that 78,9 percent of the variance in digital entrepreneurial intent can be accounted for by the instruction in the principles and practices of entrepreneurship and entrepreneurial attitude variables, with a high level of prediction accuracy.

To assess the measurement model and structural model, a test known as the size effect test (f^2) is utilized. This test determines the level of correlation between the exogenous latent variable and the structural model. This test employs three main criteria, namely 0,35 (large), 0,15 (medium), and 0,02 (small), to assess the degree of effect size impact. The relationship between entrepreneurial attitude and digital entrepreneurial intention has an f^2 value of 1,12, as shown by the analysis, representing a substantial effect size. Additionally, the f^2 value for the association between entrepreneurship education and an entrepreneurial attitude with digital entrepreneurial intention is 0,65, which also indicates a significant effect size.

Table 4. Analysis of structural paths

Paths	Direct Effect	Beta	T-value	P-value	Result
H1	Entrepreneurship Education → Digital Entrepreneurial Intention	0,474	3,208	0,001	Supported
H2	Entrepreneurship Education → Entrepreneurial Attitude	0,863	3,715	0,000	Supported
H3	Entrepreneurial Attitude → Digital Entrepreneurial Intention	0,338	2,219	0,000	Supported
H4	Entrepreneurship Education X Entrepreneurial Attitude → Digital Entrepreneurial Intention.		2,137	0,002	Supported

The relevant forecast examination aims to evaluate how well the estimated parameters of the model correspond to its observed value. If the Q^2 total is greater than zero, it suggests that the model has a strong projecting significance value. Conversely, if the score is less than zero, it indicates the opposite. The Q^2 score is obtained by applying the formula 1 - (1-R^2). The preliminary testing results demonstrate that each variable has a Q^2 score greater than zero, which is a strong indication of a robust projected relevance value of the model in this study.

The purpose of assessing PLS-SEM and structural models is achieved through path coefficients, and a bootstrap resampling method is used to acquire the t-value or t-statistic. The bootstrap criterion is a non-parametric method used to evaluate the accuracy and precision of PLS-SEM testing. It is demonstrated by table 4 and figure 2 that the path coefficient (p-value) of the four variable relationships is less than 0,05, with a value of 0,000-0,002.

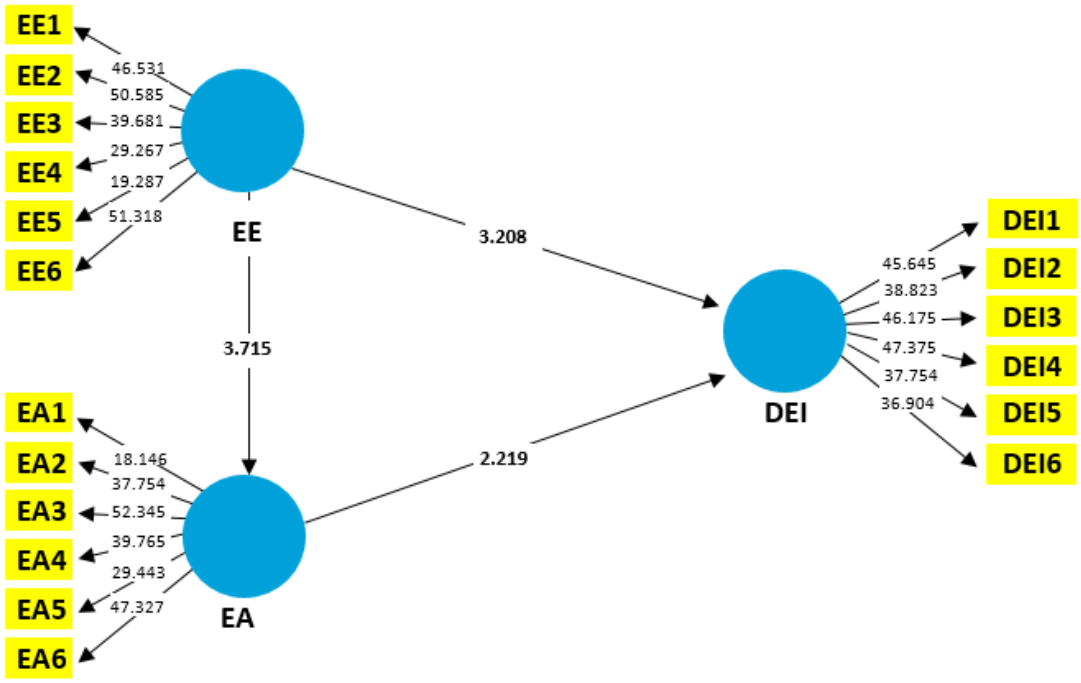

Figure 2. Model for structural equation research's findings

DISCUSSION

The significant influence of entrepreneurship education on digital entrepreneurial intention found in this study aligns with the broader consensus in the literature. A meta-analysis by Porfírio et al. demonstrated consistent effect sizes (ranging from β = 0,32 to 0,48) between entrepreneurship programs and entrepreneurial intentions across diverse cultural contexts.[35,36] The strength of the relationship found in our study (β = 0,474) sits at the higher end of this range, suggesting that the vocational education context in Indonesia—with its inherent focus on practical readiness for work—may impart a more tangible impact compared to general academic settings. This is corroborated by the longitudinal findings of Yousaf et al. in Pakistan, which revealed that technology-integrated entrepreneurship curricula had particularly strong impacts on digital venture creation intentions. The difference may be explained by the more applied, hands-on learning approach in vocational schools, which is designed to develop practical competencies for the workplace, including digital entrepreneurship.[37,38]

The notably strong pathway from entrepreneurship education to entrepreneurial attitude (β = 0,863) provides empirical validation for conceptual models like Baggen's, which posited that educational interventions targeting opportunity recognition and creative problem-solving can transform students' fundamental approaches to challenges.[31,39] This finding is further supported by an experimental study in Indonesian universities [40,41,42], which demonstrated that project-based learning modules increased students' entrepreneurial self-efficacy and positive attitudes significantly more than traditional lecture methods. The high variance explained in attitude (57,2 %) indicates that entrepreneurship education in Indonesian vocational schools is effectively instilling a positive cognitive-affective evaluation of an entrepreneurial career.

A key theoretical contribution of this research is the confirmation of entrepreneurial attitude as a significant mediator. This finding substantially reinforces the cognitive-affective model of entrepreneurial career choice proposed by [33,43], which positions attitude as the central hub connecting educational inputs with behavioral outputs. The results also provide empirical grounding for Bandura's social cognitive theory in the digital entrepreneurship domain, demonstrating how educational experiences shape self-referential thought patterns that subsequently guide career intentions. This mediation pathway is substantiated by Fayolle's longitudinal research in French business schools, which found that attitude development accounted for a large portion of education's total effect on career intentions. The strength of this mediation in the Indonesian context may reflect the collectivistic cultural aspects, where education plays a crucial role in shaping not just knowledge but also social perceptions about the desirability and feasibility of a career path.[44]

The digital-specific focus of this study yields important contextual insights. As Sitaridis and Kitsios (2024) systematically documented, most existing entrepreneurship education research fails to account for the unique competencies required in digital ventures, such as platform literacy and data-driven decision-making.[45,46] By examining intention formation specifically for digital entrepreneurship, this study addresses Atanasova's call for domain-specific investigations. The high explanatory power of the model (R^2 = 0,789 for digital entrepreneurial intention) suggests that traditional entrepreneurship education frameworks require adaptation to remain relevant in increasingly digitalized economies.[47,48]

These findings carry particular significance for Indonesia's vocational education system, where, as Sunyoto and Setiyawan documented, entrepreneurship curricula often remain outdated and poorly aligned with digital economy needs.[49] This study confirms that efforts to modernize these curricula by strengthening attitude-shaping components—such as project-based learning, interaction with digital entrepreneur role models, and online business simulations—could be highly effective in preparing vocational graduates for the future economy.

CONCLUSION

This study confirms the critical role of entrepreneurship education in fostering digital entrepreneurial intention among Indonesian vocational students, primarily through the development of a positive entrepreneurial attitude. The findings demonstrate that entrepreneurial attitude acts as a significant mediator, highlighting the importance of cognitive and affective processes in translating educational experiences into career aspirations.

Theoretically, this research strengthens the application of the Theory of Planned Behavior in the context of digital entrepreneurship and emphasizes the need for domain-specific studies that account for the unique competencies required in the digital economy.

From a practical perspective, these findings provide a clear rationale for Indonesian vocational institutions to strengthen their entrepreneurship curricula. Efforts should focus on modernizing educational content to include digital competencies and, more importantly, on integrating pedagogical components specifically designed to shape entrepreneurial attitudes, such as experiential learning, mentorship from digital entrepreneurs, and project-based activities.

Future research should expand to include a more diverse national sample of vocational students, incorporating both public and private institutions, and employ stratified random sampling to enhance the generalizability of the findings. Further investigation using mixed-methods approaches is also recommended to gain a deeper, more nuanced understanding of the factors influencing entrepreneurial disposition in this context.

REFERENCES

1. Inkizhinov B, Gorenskaia E, Nazarov D, Klarin A. Entrepreneurship in emerging markets: mapping the scholarship and suggesting future research directions. International Journal of Emerging Markets. 2020;16(7):1404–29. http://dx.doi.org/10.1108/IJOEM-11-2019-0988

2. Vorley T, Williams N. Fostering entrepreneurship and economic growth: Pathways to economic resilience in Kosovo. World Review of Entrepreneurship, Management and Sustainable Development. 2017;13(2–3):159–77. http://dx.doi.org/10.1504/WREMSD.2017.083019

3. Prasetyo PE, Kistanti NR. Human capital, institutional economics and entrepreneurship as a driver for

quality & sustainable economic growth. Entrepreneurship and Sustainability Issues. 2020;7(4):2575–89. http://dx.doi.org/10.9770/jesi.2020.7.4(1)

4. Widodo, Baswedan AR, Suyata P, Saputra WNE. Entrepreneurship education in vocational schools: an Indonesian model. International Journal of Evaluation and Research in Education. 2025;14(1):373–81. http://dx.doi.org/10.11591/ijere.v14i1.32317

5. Jalinus N, Ganefri, Syahril, Zaus MA, Islami S. Gamification in work-based learning in vocational education to support students' coding abilities. Indonesian Journal of Electrical Engineering and Computer Science. 2025;37(2):1262–73. http://dx.doi.org/10.11591/ijeecs.v37.i2.pp1262-1273

6. Jazuli MN, Sudarmiatin S, Wardana LW. Fostering Entrepreneurial Interest: Role Models, Entrepreneurship Education, And Locus Of Control In Banyuwangi Vocational High School Students. International Education Trend Issues. 2023;1(3):481–99. http://dx.doi.org/10.56442/ieti.v1i3.331

7. Maulida FH, Noviani L, Sudarno S. Exploring Entrepreneurial Intentions among Vocational High School Graduates: The Impact of Entrepreneurial Knowledge and Attitude. Indonesian Journal of Social Research (IJSR). 2024;6(2):77–91. http://dx.doi.org/10.30997/ijsr.v6i2.449

8. Hidayat R. A Systematic Literature Review of Prior Studies on the Indonesian Independent Campus Policy (2020–2023). In: Higher Education Forum. Research Institute for Higher Education, Hiroshima University; 2025. p. 69–97. http://dx.doi.org/10.15027/0002040521

9. Rijal S, Rahmatullah R, Sriwahyuni S, Arisah N, Tadampali ACT. Influence of Economic Literacy, Entrepreneurship Education and Entrepreneur Mindset in Improving The Competitiveness of Small and Medium Enterprises" (SMES) with Business Performance as A Moderator Variable. International Journal of Business, Law, and Education. 2025;6(1):568–97. http://dx.doi.org/10.56442/ijble.v6i1.1049

10. Ardi Z, Yulastri A, Hidayat H, Ganefri G, Yuliana Y, Susanto P, et al. Enhancing entrepreneurial intention through curriculum, risk awareness, optimism and opportunities: the mediating and moderating roles of entrepreneur inspiration and support. Journal of Social and Economic Development. 2025;27(1):352–71. http://dx.doi.org/10.1007/s40847-024-00339-3

11. Wahjudono DBK, Murwani FD, Satrya DG, Aji IDK. Determining Factors of Student'S Entrepreneurial Intention in Indonesia: a Meta-Analysis. Jurnal Aplikasi Manajemen. 2019;17(3):471–8. http://dx.doi.org/10.21776/UB.JAM.2019.017.03.11

12. Thamrin M, Susanto P, Syahrizal. Organizational culture and ambidexterity in the entrepreneurial orientation-performance link in Indonesia's police. International Journal of Innovative Research and Scientific Studies. 2025;8(2):3529–42. http://dx.doi.org/10.53894/ijirss.v8i2.6050

13. Ouazzani K El, González-Pernía JL, Jung A, Peña-Legazkue I. Gender, family and cultural perspectives on venture growth aspirations. European Journal of International Management. 2021;16(2):332–57. http://dx.doi.org/10.1504/ejim.2021.117116

14. Hajar Dewantara, Muhammad Aras. The Influence of Entrepreneurial Motivation and Family Environment on Entrepreneurial Interest: The Mediating Role of Self-Efficacy. Pinisi Journal of Entrepreneurship Review. 2025;3(1):1–11. http://dx.doi.org/10.62794/pjer.v3i1.7713

15. Tentama F, Paputungan TH. Entrepreneurial intention of students reviewed from self-efficacy and family support in vocational high school. International Journal of Evaluation and Research in Education. 2019;8(3):557–62. http://dx.doi.org/10.11591/IJERE.V8I3.20240

16. Fiandra YA, Yulastri A, Ganefri, Sakti RH. The Impact of Work Experience on Entrepreneurial Intention Among Vocational Education Students. Journal of Technical Education and Training. 2023;15(4):37–49.

17. Yulastri A, Ganefri, Ferdian F, Elfizon, Fiandra YA, Farell G. University Students' Intentions Toward Entrepreneurial Careers in the Hospitality and Tourism Sector: Empirical Insights From the Techno-Savvy Generation in Higher Education. Journal of Applied Engineering and Technological Science. 2025;6(2):1121–34.

http://dx.doi.org/10.37385/jaets.v6i2.6328

18. Yulastri A, Ganefri, Fiandra YA, Ferdian F, Elfizon. A Systematic Review Looking at Digital Integration in Entrepreneurship Education in Higher Education. Salud, Ciencia y Tecnologia. 2025;5. http://dx.doi.org/10.56294/saludcyt20251864

19. Wentrup R, Nakamura HR, Ström P. Closing the Digital Entrepreneurship Gap the Case of Returnee Entrepreneurs in Morocco. Journal of Entrepreneurship and Innovation in Emerging Economies. 2020;6(1):140–62. http://dx.doi.org/10.1177/2393957519885513

20. Lamine W, Fayolle A, Jack S, Audretsch D. Impact of digital technologies on entrepreneurship: Taking stock and looking forward. Technovation. 2023;126:102823. http://dx.doi.org/10.1016/j.technovation.2023.102823

21. Fernandes C, Ferreira JJ, Veiga PM, Kraus S, Dabić M. Digital entrepreneurship platforms: Mapping the field and looking towards a holistic approach. Technology in Society. 2022;70(101979):101979. http://dx.doi.org/10.1016/j.techsoc.2022.101979

22. Bensaid W, Azdimousa H. Digital entrepreneurship vs. Traditional entrepreneurship : the setting up of a global conceptual model. International Journal of Economic Studies and Management (IJESM). 2021;1(1):86–92. http://dx.doi.org/10.52502/ijesm.v1i1.159

23. Amalia RT, von Korflesch HFO. Entrepreneurship education in Indonesian higher education: mapping literature from the Country's perspective. Entrepreneurship Education. 2021;4(3):291–333. http://dx.doi.org/10.1007/s41959-021-00053-9

24. Ajzen I. The theory of planned behavior. Handbook of Theories of Social Psychology: Volume 1. 2012;50(2):438–59. http://dx.doi.org/10.4135/9781446249215.n22

25. Mishra A, Singh P. Attitude, Subjective Norms, and Perceived Behavioural Control as Predictors of Entrepreneurial Intentions Among Engineering Students. Prabandhan: Indian Journal of Management. 2022;15(5):43–58. http://dx.doi.org/10.17010/pijom/2022/v15i5/169580

26. Al-Jubari I. College students' entrepreneurial intention: Testing an integrated model of SDT and TPB. SAGE Open. 2019;9(2):1–15. http://dx.doi.org/10.1177/2158244019853467

27. Mohd Noor NH, Malek EN. An Application of Theory of Planned Behavior in Determining Student Entrepreneurship Intention. Jurnal Intelek. 2021;16(1):207–14. http://dx.doi.org/10.24191/JI.V16I1.382

28. Tsaknis PA, Sahinidis AG. An investigation of entrepreneurial intention among university students using the theory of planned behavior and parents' occupation. In: Entrepreneurial Development and Innovation in Family Businesses and SMEs. University of West Attica, Greece, Greece; University of West Attica, Greece: IGI Global; 2020. p. 149–66. http://dx.doi.org/10.4018/978-1-7998-3648-3.ch009

29. Shah IA, Amjed S, Jaboob S. The moderating role of entrepreneurship education in shaping entrepreneurial intentions. Journal of Economic Structures. 2020;9(1). http://dx.doi.org/10.1186/s40008-020-00195-4

30. Anwar I, Thoudam P, Saleem I. Role of entrepreneurial education in shaping entrepreneurial intention among university students: Testing the hypotheses using mediation and moderation approach. Journal of Education for Business. 2022;97(1):8–20. http://dx.doi.org/10.1080/08832323.2021.1883502

31. Wardana LW, Narmaditya BS, Wibowo A, Mahendra AM, Wibowo NA, Harwida G, et al. The impact of entrepreneurship education and students' entrepreneurial mindset: the mediating role of attitude and self-efficacy. Heliyon. 2020;6(9):e04922. http://dx.doi.org/10.1016/j.heliyon.2020.e04922

32. Bui HT, Le TTT, Tran AKT, Tran TPT, Hoang G, Luu TT. Entrepreneurship education fostering entrepreneurial intentions: The serial mediation effect of resilience and opportunity recognition. Journal of Education for Business. 2025;100(2):69–80. http://dx.doi.org/10.1080/08832323.2024.2449499

33. Rodrigues M, Silva R, Franco M. Entrepreneurial Attitude and Intention in Higher Education Students:

What Factors Matter? Entrepreneurship Research Journal. 2023;13(2):251–80. http://dx.doi.org/10.1515/ERJ-2020-0107

34. Hoang G, Trong Luu T. The Curvilinear Effect of Entrepreneurship Education on Entrepreneurial Intentions: The Roles of Entrepreneurial Passion and Resilience. Journal of Management Education. 2025;49(1):9–44. http://dx.doi.org/10.1177/10525629241263801

35. Tamba J, Naibaho DT, Ingtyas FT, Ginting L. Meta Analysis of the Influence of Entrepreneurship Education on Students' Entrepreneurial Interest. Journal Corner of Education, Linguistics, and Literature. 2024;4(001):23–8. http://dx.doi.org/10.54012/jcell.v4i001.358

36. Bae TJ, Qian S, Miao C, Fiet JO. The Relationship Between Entrepreneurship Education and Entrepreneurial Intentions: A Meta-Analytic Review. Entrepreneurship: Theory and Practice. 2014;38(2):217–54.

37. Fawaid M, Triyono MB, Sofyan H, Nurtanto M, Mutohhari F, Jatmoko D, et al. Entrepreneurial Intentions of Vocational Education Students in Indonesia: PLS-SEM Approach. Journal of Technical Education and Training. 2022;14(2 SPECIAL ISSUE):91–105.

38. Karyaningsih RPD, Wibowo A, Saptono A, Narmaditya BS. Does entrepreneurial knowledge influence vocational students' intention? Lessons from indonesia. Entrepreneurial Business and Economics Review. 2020;8(4):138–55.

39. Suprapto, Herta A. Entrepreneurship education as the molding of entrepreneurial attitudes: A case study. International Journal of Economics and Business Administration. 2018;6(3):127–35.

40. Ambiyar, Waskito, Efendi R, Wulandari RA. Fostering Lifelong Competency Development: A Digital Authentic Assessment Model for Vocational Internship Programs. International Journal of Interactive Mobile Technologies. 2025;19(6):182–96. http://dx.doi.org/10.3991/ijim.v19i06.53813

41. Ganefri, Waras, Trisno B, Nordin NM, Hidayat H, Rahmawati Y, et al. Cultivating digital entrepreneurs: Unravelling factors shaping digital entrepreneurship intention among engineering students in higher education. The International Journal of Management Education. 2025;23(2):101100.

42. Widjaja SUM, Wibowo A, Narmaditya BS, Wardoyo C, Saptono A. Identifying factors affecting entrepreneurship education and entrepreneurial intention among Indonesian university students. Entrepreneurial Business and Economics Review. 2022;10(3):89–104.

43. Asnur L, Jalinus N, Faridah A, Irfan D, Mubai A, Utami F. Empowering Project-Based Learning Model With Video Blog. TEM Journal. 2025;14(1):707–15. http://dx.doi.org/10.18421/TEM141-63

44. Fauzi RUA. Does Entrepreneurship Education Promote Students Entrepreneurial Intentions in Indonesia? the Mediating Role of Motivation and Attitude. Proceedings on Engineering Sciences. 2022;4(2):125–36.

45. Fadillah R, Ganefri, Yulastri A, Hidayat H. Development of Mobile Learning Based on Digital Entrepreneurs Using Raspberry Pi on TVET. International Journal on Advanced Science, Engineering and Information Technology. 2023;13(6):2231–9.

46. Ngoasong MZ. Digital entrepreneurship in a resource-scarce context: A focus on entrepreneurial digital competencies. Journal of Small Business and Enterprise Development. 2018;25(3):483–500.

47. Mir AA, Hassan S, Khan SJ. Understanding digital entrepreneurial intentions: A capital theory perspective. International Journal of Emerging Markets. 2023;18(12):6165–91.

48. Dutot V, Van Horne C. Digital Entrepreneurship Intention in a Developed vs. Emerging Country: An Exploratory Study in France and the UAE. Transnational Corporations Review. 2015;7(1):79–96.

49. Sunyoto S, Setiyawan A. Entrepreneurship Education in Vocational Schools in Indonesia. In: Education at the Intersection of Globalization and Technology. IntechOpen; 2021.

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CONFLICT OF INTEREST

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