INTERNATIONAL JOURNAL OF
EDUCATION, PSYCHOLOGY
AND COUNSELLING
(IJEPC)<https://gaexcellence.com/ijepe>**BEYOND DIGITAL ENTREPRENEURSHIP EDUCATION:
PARALLEL PATHWAYS THROUGH ATTITUDE AND SELF-
EFFICACY TO DIGITAL ENTREPRENEURIAL INTENTION**Norulhuda Awang^{1*}, Mazita Mokhtar², Nor Aine Bahari³¹Faculty of Industrial Management, Universiti Malaysia Pahang Al-Sultan Abdullah, Malaysia huda241089@gmail.com <https://orcid.org/0009-0004-8824-5463>²Faculty of Industrial Management, Universiti Malaysia Pahang Al-Sultan Abdullah, Malaysia mazita@umpsa.edu.my <https://orcid.org/0000-0003-4925-0441>³Faculty of Industrial Management, Universiti Malaysia Pahang Al-Sultan Abdullah, Malaysia ainebahari@umpsa.edu.my <https://orcid.org/0009-0002-7029-705X>

*Corresponding Author

Article Info:**Article history:**

Received date: 15.07.2026

Revised date: 30.07.2026

Accepted date: 20.08.2026

Published date: 08.09.2026

To cite this document:

Awang, N., Mokhtar, M., & Bahari, N. A. (2026). Beyond Digital Entrepreneurship Education: Parallel Pathways Through Attitude and Self-Efficacy to Digital Entrepreneurial Intention. *International Journal of Education, Psychology and Counselling*, 11(64), 421-438.

Abstract:

Digital entrepreneurship education is increasingly important in preparing students to identify and pursue digitally enabled venture opportunities. However, the psychological mechanisms connecting educational exposure with digital entrepreneurial intention remain insufficiently differentiated. Drawing on the Theory of Planned Behaviour and Social Cognitive Career Theory, this study examines digital entrepreneurial attitude and digital entrepreneurial self-efficacy as parallel pathways linking digital entrepreneurship education to digital entrepreneurial intention. A quantitative cross-sectional survey was conducted among 304 Bumiputera students representing five categories of MARA higher education institutions in Malaysia. The proposed relationships were analysed using partial least squares structural equation modelling. The results showed that digital entrepreneurship education was positively associated with digital entrepreneurial intention ($\beta = .197, p < .001$), digital entrepreneurial attitude ($\beta = .700, p < .001$), and digital entrepreneurial self-efficacy ($\beta = .697, p < .001$). Digital entrepreneurial attitude ($\beta = .120, p = .008$) and digital entrepreneurial self-efficacy ($\beta = .197, p < .001$) were also positively associated with digital entrepreneurial intention. Both indirect pathways were statistically significant, with digital entrepreneurial attitude mediating the relationship between digital entrepreneurship education and digital entrepreneurial intention ($\beta = .084, p = .018$), and digital entrepreneurial self-efficacy demonstrating a significant indirect effect ($\beta = .137, p = .001$). These findings indicate that digital entrepreneurship

education is associated with entrepreneurial intention through complementary evaluative and capability-based mechanisms. The study contributes to digital entrepreneurship education literature by distinguishing educational exposure, entrepreneurial attitude, self-efficacy, and motivational commitment within a focused theoretical framework. It also provides practical guidance for higher education institutions seeking to strengthen students' favourable evaluation of digital entrepreneurship, practical confidence, and readiness to pursue digitally enabled venture creation.

DOI: 10.35631/IJEPC.1164021

Keywords:

Digital Entrepreneurial Attitude; Digital Entrepreneurial Intention; Digital Entrepreneurial Self-Efficacy; Digital Entrepreneurship Education; Higher Education; Malaysia; PLS-SEM



© The authors (2026). This is an Open Access article distributed under the terms of the Creative Commons Attribution (CC BY NC) (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited. For commercial re-use, please contact ijepec@gaexcellence.com.

Introduction

Digital technologies have changed not only how ventures operate but also how entrepreneurial opportunities are discovered, tested, and scaled. Digital entrepreneurship differs from the simple adoption of technology by an established firm because digital artifacts, platforms, and infrastructures can become integral to opportunity formation and venture architecture (Elia et al., 2020; Paul et al., 2023). As a result, higher education institutions have expanded entrepreneurship curricula to include digital business models, online marketing, e-commerce, platform-based ventures, and technology-enabled experimentation (Duong et al., 2024; Liang et al., 2025; Lopes et al., 2025). Recent reviews indicate that digital and AI-supported entrepreneurship education requires deliberate pedagogical design (Chen et al., 2024; Yu et al., 2025). The educational challenge is no longer merely to persuade students that entrepreneurship is valuable. It is to help them evaluate digital entrepreneurship favourably, believe that they can perform its tasks, and form a credible intention to pursue it.

Research generally shows that entrepreneurship education is associated with entrepreneurial intention, although the magnitude and mechanisms of this relationship vary across research designs and contexts (Nabi et al., 2017; Ahmed et al., 2020; Xanthopoulou & Sahinidis, 2024; Otache et al., 2024). Recent digital entrepreneurship research has examined education, entrepreneurial alertness, digital competence, attitude, self-efficacy, and intention (Wibowo et al., 2023; Duong et al., 2024; Wardoyo et al., 2025; Liang et al., 2025; Lopes et al., 2025). However, many studies employ broad predictor configurations or treat education as a relatively uniform educational input. This approach can conceal an important distinction. Education may

be associated with intention because students come to regard digital entrepreneurship as desirable; it may also be associated with intention because students gain confidence in their ability to identify opportunities, develop solutions, commercialise ideas, and solve digital-business problems. Desirability and capability are related but not interchangeable.

This distinction is especially important in professionally and technically oriented higher education. MARA higher education institutions form a specialised Malaysian educational ecosystem with a socioeconomic mandate centred on Bumiputera education and human-capital development (Majlis Amanah Rakyat [MARA], n.d.). Their students commonly encounter entrepreneurship within applied academic and professional programs rather than solely as an elective career-development activity. An institution may provide entrepreneurship modules, workshops, and projects, but participation alone does not establish whether students have developed a favourable digital entrepreneurial attitude, task-specific self-efficacy, or a firm intention to create a venture. Evidence from this context can so refine the assumption that the availability of entrepreneurship education is equivalent to its psychological effectiveness.

This study integrates the Theory of Planned Behaviour (TPB; Ajzen, 1991) and Social Cognitive Career Theory (SCCT; Lent et al., 1994) to examine a focused educational–cognitive subsystem of digital entrepreneurial intention. TPB explains why a favourable evaluation of digital entrepreneurship should be associated with intention. SCCT explains why educational learning experiences should be associated with self-efficacy and why capability beliefs matter for career-related choices. Recent research also indicates that self-efficacy and attitude can operate as psychological mechanisms connecting entrepreneurship education with entrepreneurial intention (Otache et al., 2024; Duong et al., 2024; Wardoyo et al., 2025). Rather than combining all antecedents into a single undifferentiated explanation, the model separates digital entrepreneurship education (DEE), digital entrepreneurial attitude (DEA), digital entrepreneurial self-efficacy (DESE), and digital entrepreneurial intention (DEI).

Four research questions guide the paper. RQ1 examines the association between digital entrepreneurship education (DEE) and digital entrepreneurial intention (DEI). RQ2 examines the associations of DEE with digital entrepreneurial attitude (DEA) and digital entrepreneurial self-efficacy (DESE). RQ3 investigates how DEA and DESE are associated with DEI. RQ4 examines whether DEA and DESE transmit statistically significant indirect associations between DEE and DEI. The study makes three contributions. First, it distinguishes evaluative cognition, represented by attitude, from capability cognition, represented by self-efficacy, within a parallel-pathway model. Second, it functionally integrates TPB and SCCT by examining attitude- and self-efficacy-based indirect pathways instead of merely combining multiple predictors. Third, it extends the evidence base to a policy-oriented, applied higher-education ecosystem within an underrepresented emerging-economy context.

Theoretical Background and Hypotheses

Digital Entrepreneurship Education and Intention

Digital entrepreneurship education refers to organised learning experiences designed to develop knowledge, skills, awareness, and practical engagement relevant to digitally mediated venture creation. Its content may include opportunity recognition, digital business models, platform strategy, e-commerce, online customer development, digital marketing, data use, and technology-enabled experimentation (Secundo et al., 2020; Ratten & Usmanij, 2021; Sitaridis

& Kitsios, 2024). This scope is narrower than general entrepreneurship education because digital technologies are embedded in the opportunity, value proposition, delivery process, or business model.

Education may shape intention in several ways, and these processes can occur together. It can increase awareness of entrepreneurship as a career, provide realistic information, expose students to role models, and offer guided experience in venture tasks. A well-designed programme can also reduce ambiguity surrounding venture creation by helping students translate an abstract aspiration into identifiable actions. Empirical work has linked entrepreneurship education with venture-creation intention in developing-economy settings (Ahmed et al., 2020; Overwien et al., 2024), while digital entrepreneurship studies report positive relationships between education and digital entrepreneurial intention (Wibowo et al., 2023; Duong et al., 2024). Even so, education should not be interpreted as automatically causal: students with stronger prior interest may evaluate their educational experiences more positively, particularly in a cross-sectional survey. The directional hypothesis is so expressed as a positive association.

H1. Digital entrepreneurship education is positively associated with digital entrepreneurial intention.

Digital Entrepreneurship Education and Attitude

TPB defines attitude toward a behaviour as the degree to which performing that behaviour is evaluated favourably or unfavourably (Ajzen, 1991). Digital entrepreneurial attitude so concerns whether students regard establishing and operating a digital venture as attractive, beneficial, satisfying, and personally worthwhile. It is not simply a positive attitude toward technology. A student may enjoy using digital tools while considering digital venture creation undesirable, risky, or inconsistent with personal goals. Educational experiences can change this evaluation because they shape students' beliefs about the behaviour. Cases, role models, market-validation activities, and venture projects make the potential outcomes of digital entrepreneurship more concrete. They may reveal autonomy, innovation, social contribution, and income opportunities, while also enabling students to evaluate uncertainty and workload realistically.

Prior research shows that entrepreneurship education is associated with entrepreneurial mindset and attitude, and that attitude is important in the formation of entrepreneurial intention (Al-Qadasi et al., 2024; Taneja et al., 2024; Wardana et al., 2020; Yousaf et al., 2021). Recent digital entrepreneurship evidence likewise positions innovative digital attitude as a relevant correlate of digital entrepreneurial intention (Lopes et al., 2025). If DEE supplies credible experiences rather than only declarative content, students should form more favourable evaluations of digital entrepreneurship.

H2. Digital entrepreneurship education is positively associated with digital entrepreneurial attitude.

Digital Entrepreneurship Education and Self-Efficacy

Self-efficacy refers to beliefs about one's capability to organise and execute actions required to attain a particular performance (Bandura, 1997). SCCT places learning experiences and self-efficacy at the centre of interest development and career choice (Lent et al., 1994). In this study,

DESE is task-specific: it captures confidence in recognising digital opportunities, generating ideas, commercialising solutions, and solving problems in digital entrepreneurial settings.

DEE may strengthen DESE through mastery experiences, modelling, feedback, and guided practice. Building a prototype, conducting customer interviews, comparing digital business models, or presenting a validated opportunity allows students to accumulate evidence about what they can do. Observing peers or entrepreneurs can provide vicarious learning, while structured feedback can clarify standards and strategies.

Research across university and vocational settings links entrepreneurship education with entrepreneurial self-efficacy (Amani et al., 2024; Nowiński et al., 2019; Wardana et al., 2020). Digital entrepreneurship studies have similarly reported that education is associated with digital entrepreneurial self-efficacy and intention (Duong et al., 2024). The task-specific nature of DESE is especially important: confidence in general study or technology use does not necessarily imply confidence in creating a viable digital venture.

H3. Digital entrepreneurship education is positively associated with digital entrepreneurial self-efficacy.

Attitude, Self-Efficacy, And Digital Entrepreneurial Intention

DEI captures a student's conscious readiness, determination, and planned effort to create a digitally enabled venture. Within TPB, intention is the immediate motivational antecedent of behaviour, while attitude is one of its principal determinants (Ajzen, 1991). Students who judge digital entrepreneurship to be attractive and worthwhile should be more willing to invest attention and effort in pursuing it. Meta-analytic and cross-national evidence has repeatedly identified attitude as a central correlate of entrepreneurial intention (Schlaegel & Koenig, 2014; Liñán & Chen, 2009).

SCCT adds a capability-based explanation. Career choices depend partly on whether individuals believe that they can perform the relevant activities and manage anticipated barriers (Lent et al., 1994). Digital entrepreneurship involves uncertain, iterative, and technology-mediated tasks. Students who feel capable of identifying opportunities, developing digital offers, and solving venture problems should be more likely to view the career as feasible. Self-efficacy has been linked with entrepreneurial intention across education contexts (Nowiński et al., 2019; Yousaf et al., 2021), and recent work emphasises the relevance of digital self-efficacy or entrepreneurial self-efficacy for digitally intensive entrepreneurship (Sutiadiningsih et al., 2025).

Attitude and self-efficacy are related, but they are not the same. Attitude captures desirability; self-efficacy captures perceived capability. A student may admire digital entrepreneurship without feeling able to undertake it, or feel capable without preferring it as a career. Examining them simultaneously so prevents a positive evaluation from being mistaken for capability and enables a more precise account of intention formation.

H4. Digital entrepreneurial attitude is positively associated with digital entrepreneurial intention.

H5. Digital entrepreneurial self-efficacy is positively associated with digital entrepreneurial intention.

Parallel Attitudinal and Capability Pathways

Taken together, the links from education to cognition and from cognition to intention suggest that DEE should also have indirect associations with DEI through DEA and DESE. The attitude pathway represents an evaluative process: education helps students form behavioural beliefs that make digital entrepreneurship more or less desirable. The self-efficacy pathway represents a capability process: learning experiences provide mastery, modelling, and feedback that shape whether students believe they can execute digital entrepreneurial tasks. Testing both pathways in parallel clarifies whether educational exposure is associated with intention through complementary psychological processes (Al-Qadasi et al., 2024; Amani et al., 2024).

H6. Digital entrepreneurial attitude mediates the positive association between digital entrepreneurship education and digital entrepreneurial intention.

H7. Digital entrepreneurial self-efficacy mediates the positive association between digital entrepreneurship education and digital entrepreneurial intention.

Research Framework

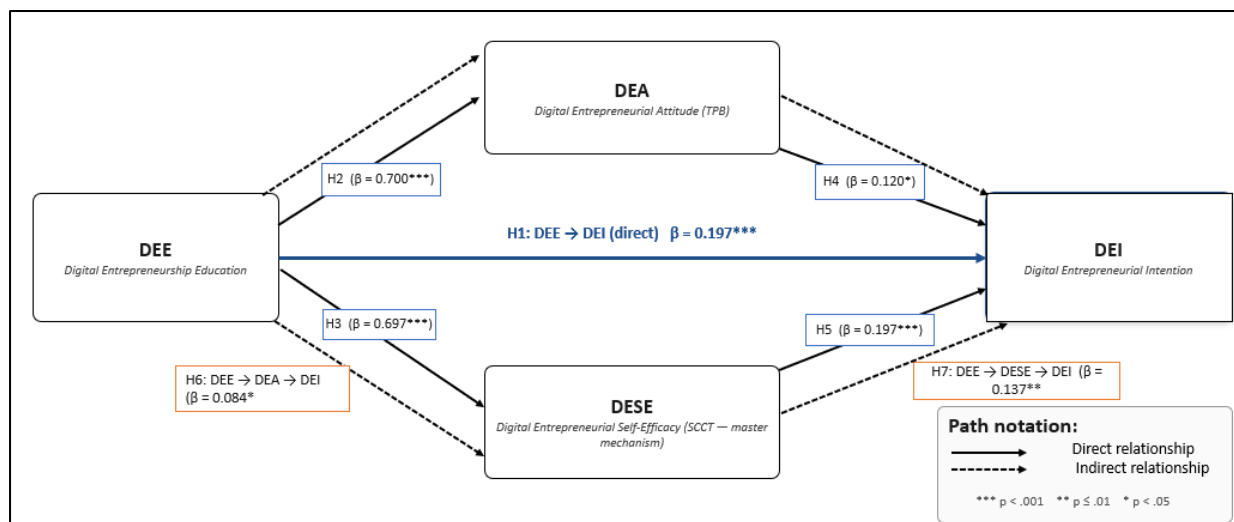


Figure 1. Focal Structural Relationships and Standardised Path Coefficients.

Methodology

Research Design and Sample

The study used a quantitative cross-sectional survey. The target population comprised Bumiputera students enrolled in MARA higher education institutions in Malaysia. We used purposive sampling to recruit students in Semester 4 or above who had completed an entrepreneurship course and could provide relevant responses concerning the study constructs. We initially received 310 collected questionnaires. Six cases exceeding the predetermined missing-data threshold were removed, resulting in a final sample of 304 respondents. The sample comprised 169 male respondents (55.6%) and 135 female respondents (44.4%). Most respondents were aged 18–20 years ($n = 222$, 73.0%), while 82 respondents (27.0%) were aged 21 years or above. All respondents had completed an entrepreneurship course, ensuring that they had relevant educational experience when assessing digital entrepreneurship education.

Also, 221 respondents (72.7%) reported prior business experience, whereas 83 respondents (27.3%) had no prior business experience. Participation was voluntary, informed consent was obtained, and all responses were treated confidentially.

Table 1: Respondent Profile (N = 304)

Characteristic	Category	n	%
Gender	Male	169	55.6
	Female	135	44.4
Age	18–20 years	222	73.0
	21 years or above	82	27.0
Prior business experience	Yes	221	72.7
	No	83	27.3
Entrepreneurship course	Yes	304	100

Measures

All four constructs were measured reflectively with established entrepreneurship and digital-entrepreneurship measures adapted to the MARA student context. DEE contained five items covering specialised digital entrepreneurship programmes, relevant knowledge, educational encouragement, the perceived role of education in initiating entrepreneurship, and course-based project involvement. DEA contained four items assessing the attractiveness, advantages, satisfaction, and preference associated with a digital entrepreneurial career. DESE comprised four items assessing confidence in opportunity recognition, idea generation, commercialisation, and problem solving. DEI contained five items addressing readiness, effort, serious consideration, determination, and firm intention to start a digital business. DEE, DEA, and DESE used five-point agreement scales; DEI used a seven-point agreement scale. Using different scale lengths does not invalidate PLS-SEM estimates, although it should be disclosed because it may affect observed response distributions.

Seven reviewers assessed the questionnaire content and was pilot tested with 40 respondents. The wording was refined for clarity and contextual relevance. As the measures were adapted rather than newly created, the main study assessed indicator reliability, internal consistency, convergent validity, and discriminant validity before testing the structural relationships.

Analytical Procedure

We used SmartPLS 4 to conduct PLS-SEM because the study estimated multiple latent-variable relationships simultaneously and emphasised prediction and explained variance (Hair et al., 2022). The measurement model was evaluated using outer loadings, Cronbach's alpha,

composite reliability, ρ_A , average variance extracted (AVE), and the heterotrait–monotrait ratio (HTMT). Structural assessment examined collinearity, standardised path coefficients, effect sizes, and coefficients of determination.

We assessed the directional direct hypotheses using 5,000 bootstrap resamples, bias-corrected and accelerated confidence intervals, one-tailed tests, and $\alpha = .05$. The two indirect effects were assessed with 5,000 bootstrap resamples and two-tailed tests. The focal paths were estimated in the full doctoral structural model, which additionally contained perceived behavioural control, subjective norms, institutional support, digital literacy, and ChatGPT/AI adoption as predictors of DEI. Those paths answer a different research question and are not interpreted in this paper.

The reported DEI coefficient of determination and focal path estimates are so conditional on the prespecified full model rather than a newly estimated four-construct model. We addressed common method variance through both procedural and statistical checks. The first unrotated factor in Harman's single-factor assessment explained 38.281% of the variance, below the conventional 50% diagnostic threshold. A marker-variable comparison produced no material change in focal path coefficients or R^2 . These diagnostics reduce, but do not eliminate, concern about single-source measurement (Podsakoff et al., 2003).

Results and Discussion

The measurement model was assessed to establish indicator reliability, internal consistency reliability, convergent validity, and discriminant validity of the four focal constructs: digital entrepreneurship education (DEE), digital entrepreneurial attitude (DEA), digital entrepreneurial self-efficacy (DESE), and digital entrepreneurial intention (DEI). The results indicated satisfactory measurement properties across all constructs.

As presented in Table 2, all indicator loadings exceeded .80 and ranged from .814 to .960, indicating strong indicator reliability. Cronbach's alpha values ranged from .865 to .974, while Dijkstra–Henseler's ρ_A ranged from .865 to .974. Composite reliability (CR) values ranged from .908 to .979. All values exceeded the commonly accepted threshold of .70, supporting satisfactory internal consistency reliability.

Convergent validity was assessed using average variance extracted (AVE). The AVE values ranged from .711 to .905, exceeding the recommended minimum value of .50. Specifically, DEE recorded an AVE of .711, DEA .712, DESE .846, and DEI .905. These results indicate that each construct explained a substantial proportion of the variance in its respective indicators. Overall, the findings support adequate indicator reliability, internal consistency reliability, and convergent validity for all four constructs.

Table 2. Reliability and Convergent Validity

Construct	Items	Loading	Range α	ρ_A	CR	AVE
DEE	5	.814–.858	.899	.901	.925	.711
DEA	4	.836–.856	.865	.865	.908	.712
DESE	4	.906–.937	.939	.939	.957	.846
DEI	5	.927–.960	.974	.974	.979	.905

Note. DEE = digital entrepreneurship education; DEA = digital entrepreneurial attitude; DESE = digital entrepreneurial self-efficacy; DEI = digital entrepreneurial intention; α = Cronbach's alpha; ρ_A = Dijkstra–Henseler's rho; CR = composite reliability; AVE = average variance extracted.

Discriminant validity was subsequently evaluated using the heterotrait–monotrait ratio of correlations (HTMT). As shown in Table 3, HTMT values ranged from .755 to .855. All construct-pair values remained below the .90 threshold recommended by Henseler et al. (2015), indicating acceptable discriminant validity among the focal constructs.

The highest HTMT value was observed between DEE and DEI at .855. Although this value marginally exceeded the more conservative .85 criterion, it remained below .90. This finding indicates relatively close conceptual association between students' perceptions of digital entrepreneurship education and their digital entrepreneurial intention, while still providing acceptable evidence that the two constructs represent distinct concepts. The remaining HTMT values ranged from .755 to .839, further supporting discriminant validity within the measurement model.

Table 3. Heterotrait–Monotrait Ratio (HTMT)

Construct Pair	HTMT
DEA–DEE	.791
DEA–DEI	.809
DEA–DESE	.769
DEE–DEI	.855
DEE–DESE	.755
DEI–DESE	.839

Note. HTMT = heterotrait–monotrait ratio; DEE = digital entrepreneurship education; DEA = digital entrepreneurial attitude; DESE = digital entrepreneurial self-efficacy; DEI = digital entrepreneurial intention.

Taken together, the measurement model results demonstrate satisfactory reliability and validity of the four focal constructs. The indicator loadings, internal consistency estimates, and AVE values support the reliability and convergent validity of the measures, while the HTMT results provide acceptable evidence of discriminant validity. The measurement model was therefore

considered adequate for subsequent assessment of the structural relationships and proposed indirect effects.

Structural Model

Inner VIF values in the full model ranged from 1.000 to 2.988, so collinearity was not a serious concern. The full model explained 84.2% of the variance in DEI ($R^2 = .842$), while DEE explained 49.0% of the variance in DEA ($R^2 = .490$) and 48.6% of the variance in DESE ($R^2 = .486$). Because other predictors of DEI were included in the estimated model, the DEI R^2 must not be attributed to the four focal constructs alone.

All five focal hypotheses were supported. DEE was positively associated with DEI ($\beta = .197$, $t = 4.231$, $p < .001$, 95% CI [.119, .273], $f^2 = .083$), supporting H1. Its relationships with DEA ($\beta = .700$, $t = 19.185$, $p < .001$, 95% CI [.637, .757], $f^2 = .960$) and DESE ($\beta = .697$, $t = 19.336$, $p < .001$, 95% CI [.636, .754], $f^2 = .945$) were markedly larger, supporting H2 and H3. DEA was positively associated with DEI ($\beta = .120$, $t = 2.419$, $p = .008$, 95% CI [.038, .201], $f^2 = .037$), supporting H4, while DESE was also positively associated with DEI ($\beta = .197$, $t = 3.407$, $p < .001$, 95% CI [.104, .292], $f^2 = .081$), supporting H5.

The pattern is informative, but it should not be overstated. DEE exhibited large effects on both cognitive outcomes and a smaller direct effect on intention. DESE had a larger estimated relationship with intention than DEA, but no coefficient-difference test was performed; the direct coefficients should so not be treated as a statistically confirmed ranking.

Indirect Effects

Both proposed indirect associations reached statistical significance. The indirect association between DEE and DEI through DEA was $\beta = .084$ ($t = 2.370$, $p = .018$, 95% CI [.016, .154]), supporting H6. The corresponding indirect association through DESE was $\beta = .137$ ($t = 3.286$, $p = .001$, 95% CI [.058, .221]), supporting H7. Because the direct DEE–DEI relationship remained significant, both patterns were classified as partial mediation. The self-efficacy indirect coefficient was numerically larger, but the difference between the two indirect effects was not formally tested.

Table 4: Direct and Indirect Effects

Hypothesis	Relationship	β	t	p	95% CI	f^2	Decision
H1	DEE $\rightarrow$ DEI	.197	4.231	< .001	[.119, .273]	.083	Supported
H2	DEE $\rightarrow$ DEA	.700	19.185	< .001	[.637, .757]	.960	Supported
H3	DEE $\rightarrow$ DESE	.697	19.336	< .001	[.636, .754]	.945	Supported
H4	DEA $\rightarrow$ DEI	.120	2.419	.008	[.038, .201]	.037	Supported

H5	DESE → DEI	.197	3.407	< .001	[.104, .292]	.081	Supported
H6	DEE → DEA → DEI	.084	2.370	.018	[.016, .154]	—	Supported
H7	DEE → DESE → DEI	.137	3.286	.001	[.058, .221]	—	Supported

Note. Original-sample standardised coefficients are reported from the prespecified full doctoral model. Direct paths used 5,000 bootstrap resamples, BCa confidence intervals, and one-tailed tests; indirect paths used 5,000 bootstrap resamples and two-tailed tests.

Interpretation and Implications

Education Is More Strongly Associated with Cognition Than Intention

The results indicate that DEE is positively associated with DEI, consistent with studies linking entrepreneurship education to venture-creation intention (Ahmed et al., 2020; Jena, 2020) and with recent digital entrepreneurship research (Wibowo et al., 2023; Duong et al., 2024). The result supports the view that education can make a digital entrepreneurial career more visible, intelligible, and actionable. Students who report stronger educational provision and engagement also report stronger intention to pursue digital entrepreneurship.

A clearer pattern appears in the strength of DEE's relationships with DEA and DESE. Both coefficients approach .70 and explain approximately 48% of the variance in each cognitive outcome, whereas DEE's conditional direct relationship with intention is .197. This suggests that education is especially proximal to what students think and believe about digital entrepreneurship. It is more strongly associated with whether they regard the career favorably and whether they feel capable of performing its tasks than with a firm career intention. This interpretation is consistent with the educational role of changing knowledge, beliefs, and perceived capability before behavior or career commitment becomes observable.

This finding qualifies the common claim that entrepreneurship education “creates intention.” Education is better understood as a structured learning input whose immediate psychological correlates include desirability and capability. Intention is further downstream and is likely shaped by constraints and influences beyond the classroom. Because the design is cross-sectional, the temporal sequence remains theoretical rather than demonstrated. Students with favorable attitudes or strong confidence may also evaluate education more positively.

Attitude And Self-Efficacy Are Distinct Correlates Of Intention

Both DEA and DESE were positively associated with DEI. The attitude result supports TPB's proposition that behavioural evaluations matter for intention (Ajzen, 1991) and aligns with evidence that innovative digital attitude is related to digital entrepreneurial intention (Lopes et al., 2025). A student who considers a digital entrepreneurial career attractive and satisfying is more likely to report readiness and determination to pursue it.

DESE displayed a comparatively larger coefficient than DEA. This pattern is theoretically plausible in an applied higher-education context. Digital entrepreneurship requires students to believe that they can perform concrete tasks under uncertainty, not merely that the career is attractive. Confidence in opportunity recognition, idea generation, commercialisation, and problem solving may make a possible career feel executable. SCCT so complements TPB by explaining why capability beliefs derived from learning experiences matter for career choice (Lent et al., 1994).

However, we did not formally test the difference between the coefficients. The results justify describing DESE as having a larger estimated association but not declaring it statistically more important than DEA. Effect sizes for both intention paths were small under conventional benchmarks, although DESE's f^2 was larger. The evidence supports a more careful conclusion: attitude and self-efficacy contribute distinct information about intention and that capability appears especially relevant in the observed sample.

Two Complementary Indirect Pathways

The significant indirect effects support the proposed dual-pathway account. The attitudinal pathway indicates that educational exposure is associated with intention partly because students evaluate digital entrepreneurship more favourably. The self-efficacy pathway indicates that education is also associated with intention because students feel more capable of recognising opportunities, generating ideas, commercialising solutions, and solving digital-business problems. The two pathways are complementary: one concerns whether a digital entrepreneurial career is worth pursuing, while the other concerns whether it feels executable.

The larger estimated indirect coefficient through DESE is consistent with SCCT's emphasis on capability beliefs in career choice, especially in professionally and technically oriented education. However, the study did not test the difference between the two indirect effects, so the evidence supports two significant pathways but not a definitive claim that one mechanism is statistically stronger.

Theoretical contributions

The study offers a layered explanation of digital entrepreneurial intention by separating an educational input from two forms of cognition and from intention. This prevents conceptually different variables from being treated as interchangeable antecedents. DEE represents organised learning experience, DEA represents evaluative desirability, DESE represents perceived task capability, and DEI represents motivational commitment.

Then, it connects TPB and SCCT through complementary mechanisms rather than by accumulating their variables. TPB explains why attitude is related to intention. SCCT explains why educational experience is related to self-efficacy and why capability beliefs matter for career choice. The integration is so functional: each theory explains a different component of the education–cognition–intention architecture.

Furthermore, the significant indirect effects clarify how entrepreneurship education relates to intention. Education is associated with intention not only directly but also through favourable evaluation and perceived capability. This layered result provides an empirical bridge between

TPB's attitudinal explanation and SCCT's learning experience and self-efficacy explanation, while the cross-sectional design prevents a temporal or causal interpretation.

Besides that, the study provides evidence from Bumiputera students in MARA higher education institutions. The MARA ecosystem combines professional and technical education with an institutional mandate for Bumiputera socioeconomic development. The findings show that strong educational exposure is closely associated with both desirability and capability beliefs in this setting, while neither belief alone is equivalent to intention.

Practical Implications

Digital entrepreneurship curricula should be assessed on whether they change both desirability and capability, not merely on enrolment, satisfaction, or knowledge recall (Chen et al., 2024; Yu et al., 2025). To develop DEA, programmes can use credible role models, comparative career cases, reflection on the personal value of entrepreneurship, and exposure to diverse digital venture possibilities. The aim is not to promote entrepreneurship uncritically. It is to support an informed and favourable evaluation grounded in realistic expectations.

To develop DESE, programmes need repeated mastery experiences supported by authentic entrepreneurship tasks and structured feedback (Darnell & Gopalkrishnan, 2024). Students should identify authentic problems, conduct customer discovery, formulate and test value propositions, build a minimum viable digital offer, estimate basic resource requirements, use platform sandboxes, and defend evidence-based venture decisions. Feedback should be structured around task performance so that students can identify what they can already execute and what requires further development.

Institutions should distinguish attitude-building activities from capability-building activities in curriculum mapping and assessment. Inspirational talks may influence desirability but offer limited evidence of task competence. Conversely, technical workshops may improve capability without helping students connect those skills to a preferred career identity. A coherent programme requires both. Educators can measure DEA and DESE at the beginning and end of a programme, alongside independently assessed entrepreneurial tasks, to determine whether reported confidence corresponds with demonstrated performance.

For MARA leaders, the findings support visible progression routes from classroom projects to mentoring, validation, incubation, small experimental funding, and external market exposure. Such pathways enable students to convert educational gains into increasingly consequential action while preserving space for learning from manageable failure.

Limitations And Future Research

Several limitations shape how these findings should be read. First, the cross-sectional design establishes associations rather than temporal or causal effects. Longitudinal designs should measure educational experiences, changes in attitude and self-efficacy, later intention, and subsequent entrepreneurial behaviour at separate time points. Experimental or quasi-experimental evaluations could compare specific pedagogies and identify which learning experiences produce changes in capability and evaluation.

In addition, all focal variables were self-reported. Marker-variable and single-factor diagnostics reduce concern about common method variance but cannot eliminate it. Future studies should combine survey measures with educator ratings, behavioural traces, assessed venture tasks, participation in incubation, business registration, or revenue-generating activity. Next, purposive sampling and concentration on Bumiputera students in MARA institutions limit generalisability. Prior business experience and entrepreneurship-course participation were reported descriptively but were not modeled as controls; residual confounding by prior exposure remains possible. Replication should include other higher-education systems, vocational institutions, non-Bumiputera populations, and other national contexts. Multi-group or robustness analysis should assess differences by institution type, field of study, gender, prior business experience, and prior digital-venture exposure.

Then, the focal coefficients were estimated within a broader prespecified doctoral model. The strong DEI R^2 reflects the complete predictor set and must not be attributed to DEE, DEA, and DESE alone. A journal-specific re-estimation of the four-construct model would produce different conditional coefficients and should be conducted if the target journal requires a completely standalone structural model. Such a rerun should report updated VIF, R^2 , f^2 , Q^2 or PLSpredict, confidence intervals, and out-of-sample predictive assessment.

Lastly, both indirect effects came from cross-sectional self-report data. Their statistical significance is consistent with the proposed mechanisms but does not establish temporal mediation or causality. Longitudinal and experimental work should establish temporal ordering, formally compare the sizes of the attitude and self-efficacy pathways, examine reciprocal relationships, and test whether observed changes in confidence correspond with independently assessed entrepreneurial performance.

Conclusion

Digital entrepreneurship education relates to more than students stated intention to start a digital venture. In this sample, it was strongly associated with how students evaluate digital entrepreneurship and how capable they feel of performing its tasks. Both attitude and self-efficacy were positively associated with intention, and both transmitted significant indirect associations between education and intention while the direct relationship remained significant. By separating organised educational experience, desirability, perceived capability, and motivational commitment, the study provides a dual-pathway account of how higher education relates to digital entrepreneurial career choice. Effective programs should so make digital entrepreneurship both worth pursuing and possible to perform.

Acknowledgements: The authors would like to express their sincere appreciation to the MARA higher education institutions and all students who participated in this study.

Funding Statement: No funding.

Conflict of Interest Statement: The authors declare no conflict of interest.

Ethics Statement: The authors confirm that the research was conducted in accordance with accepted academic integrity and ethical publishing standards.

Author Contribution Statement: All authors contributed significantly to the development of this manuscript. Norulhuda Awang was responsible for the conceptualization, methodology, and overall supervision of the study. Mazita Mokhtar handled data collection, analysis, and interpretation of the results. Nor Aine Bahari contributed to the literature review, drafting, and critical revision of the manuscript. All authors read and approved the final version of the manuscript prior to submission.

References

- Ahmed, T., Chandran, V. G. R., Klobas, J. E., Liñán, F., & Kokkalis, P. (2020). Entrepreneurship education programmes: How learning, inspiration and resources affect intentions for new venture creation in a developing economy. *The International Journal of Management Education*, 18(1), 100327. <https://doi.org/10.1016/j.ijme.2019.100327>
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179–211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T)
- Al-Qadasi, N., Zhang, G., Al-Jubari, I., Al-Awlaqi, M. A., & Aamer, A. M. (2024). Entrepreneurship education and entrepreneurial behaviour: Do self-efficacy and attitude matter? *The International Journal of Management Education*, 22(1), 100945. <https://doi.org/10.1016/j.ijme.2024.100945>
- Amani, D., Ismail, I. J., Makona, A., Changelima, I. A., & Kazungu, I. (2024). Extending the mediation role of entrepreneurial self-efficacy on enhancing students' entrepreneurial intentions: A moderated mediation model. *The International Journal of Management Education*, 22(1), 100915. <https://doi.org/10.1016/j.ijme.2023.100915>
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. W. H. Freeman.
- Chen, L., Ifenthaler, D., Yau, J. Y.-K., & Sun, W. (2024). Artificial intelligence in entrepreneurship education: A scoping review. *Education + Training*, 66(6), 589–608. <https://doi.org/10.1108/ET-05-2023-0169>
- Darnell, J. A., & Gopalkrishnan, S. (2024). Entrepreneurship teaching exercises: Integrating generative AI. *Discover Education*, 3(1), Article 172. <https://doi.org/10.1007/s44217-024-00261-0>
- Duong, C. D., Ngo, T. V. N., Nguyen, T. P. T., Tran, N. M., & Pham, H. T. (2024). Digital entrepreneurial education and digital entrepreneurial intention: A moderated mediation model. *Social Sciences & Humanities Open*, 10, 101178. <https://doi.org/10.1016/j.ssaho.2024.101178>
- Elia, G., Margherita, A., & Passiante, G. (2020). Digital entrepreneurship ecosystem: How digital technologies and collective intelligence are reshaping the entrepreneurial process. *Technological Forecasting and Social Change*, 150, 119791. <https://doi.org/10.1016/j.techfore.2019.119791>
- Hair, J. F., Jr., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). *A primer on partial least squares structural equation modeling (PLS-SEM)* (3rd ed.). Sage.
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43(1), 115–135. <https://doi.org/10.1007/s11747-014-0403-8>
- Jena, R. K. (2020). Measuring the impact of business management students' attitude towards entrepreneurship education on entrepreneurial intention: A case study. *Computers in Human Behavior*, 107, 106275. <https://doi.org/10.1016/j.chb.2020.106275>
- Lent, R. W., Brown, S. D., & Hackett, G. (1994). Toward a unifying social cognitive theory of career and academic interest, choice, and performance. *Journal of Vocational Behavior*, 45(1), 79–122. <https://doi.org/10.1006/jvbe.1994.1027>
- Liang, Y., Chen, R., Hong, H., Li, S., & Han, L. (2025). Shaping digital entrepreneurial intention in higher education: The role of entrepreneurship education, creativity, and digital literacy among Chinese university students. *Journal of Innovation & Knowledge*, 10(5), 100788. <https://doi.org/10.1016/j.jik.2025.100788>

- Liñán, F., & Chen, Y.-W. (2009). Development and cross-cultural application of a specific instrument to measure entrepreneurial intentions. *Entrepreneurship Theory and Practice*, 33(3), 593–617. <https://doi.org/10.1111/j.1540-6520.2009.00318.x>
- Lopes, J. M., Gomes, S., & Nogueira, E. (2025). Educational insights into digital entrepreneurship: The influence of personality and innovation attitudes. *Journal of Innovation and Entrepreneurship*, 14, Article 16. <https://doi.org/10.1186/s13731-025-00475-y>
- Majlis Amanah Rakyat. (n.d.). *Education sector*. Retrieved August 7, 2026, from <https://www.mara.gov.my/en/index/education-sector/>
- Nabi, G., Liñán, F., Fayolle, A., Krueger, N., & Walmsley, A. (2017). The impact of entrepreneurship education in higher education: A systematic review and research agenda. *Academy of Management Learning & Education*, 16(2), 277–299. <https://doi.org/10.5465/amle.2015.0026>
- Nowiński, W., Haddoud, M. Y., Lančarič, D., Egerová, D., & Czeglédi, C. (2019). The impact of entrepreneurship education, entrepreneurial self-efficacy and gender on entrepreneurial intentions of university students in the Visegrad countries. *Studies in Higher Education*, 44(2), 361–379. <https://doi.org/10.1080/03075079.2017.1365359>
- Otache, I., Edopkolor, J. E., Sani, I. A., & Umar, K. (2024). Entrepreneurship education and entrepreneurial intentions: Do entrepreneurial self-efficacy, alertness and opportunity recognition matter? *The International Journal of Management Education*, 22(1), 100917. <https://doi.org/10.1016/j.ijme.2023.100917>
- Overwien, A., Jahnke, L., & Leker, J. (2024). Can entrepreneurship education activities promote students' entrepreneurial intention? *The International Journal of Management Education*, 22(1), 100928. <https://doi.org/10.1016/j.ijme.2023.100928>
- Paul, J., Alhassan, I., Binsaif, N., & Singh, P. (2023). Digital entrepreneurship research: A systematic review. *Journal of Business Research*, 156, 113507. <https://doi.org/10.1016/j.jbusres.2022.113507>
- Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879–903. <https://doi.org/10.1037/0021-9010.88.5.879>
- Ratten, V., & Usmanij, P. (2021). Entrepreneurship education: Time for a change in research direction? *The International Journal of Management Education*, 19(1), 100367. <https://doi.org/10.1016/j.ijme.2020.100367>
- Schlaegel, C., & Koenig, M. (2014). Determinants of entrepreneurial intent: A meta-analytic test and integration of competing models. *Entrepreneurship Theory and Practice*, 38(2), 291–332. <https://doi.org/10.1111/etap.12087>
- Secundo, G., Rippa, P., & Cerchione, R. (2020). Digital academic entrepreneurship: A structured literature review and avenue for a research agenda. *Technological Forecasting and Social Change*, 157, 120118. <https://doi.org/10.1016/j.techfore.2020.120118>
- Sitaridis, I., & Kitsios, F. (2024). Digital entrepreneurship and entrepreneurship education: A review of the literature. *International Journal of Entrepreneurial Behavior & Research*, 30(2/3), 277–304. <https://doi.org/10.1108/IJEBr-01-2023-0053>
- Sutiadiningsih, A., Dewi, I. H. P., Ratnasari, W., Taufiq, A., & Miranti, M. G. (2025). How do digital competencies promote entrepreneurial intention among vocational students? A mediation analysis of entrepreneurial self-efficacy and entrepreneurial mindset. *Cogent Education*, 12(1), 2482486. <https://doi.org/10.1080/2331186X.2025.2482486>

- Taneja, M., Kiran, R., & Bose, S. C. (2024). Assessing entrepreneurial intentions through experiential learning, entrepreneurial self-efficacy, and entrepreneurial attitude. *Studies in Higher Education*, 49(1), 98–118. <https://doi.org/10.1080/03075079.2023.2223219>
- Wardana, L. W., Narmaditya, B. S., Wibowo, A., Mahendra, A. M., Wibowo, N. A., Harwida, G., & Rohman, A. N. (2020). The impact of entrepreneurship education and students' entrepreneurial mindset: The mediating role of attitude and self-efficacy. *Heliyon*, 6(9), e04922. <https://doi.org/10.1016/j.heliyon.2020.e04922>
- Wardoyo, C., Narmaditya, B. S., Qurrata, V. A., Satrio, Y. D., & Sahid, S. (2025). Are students ready for digital business? Antecedents of entrepreneurial intentions among Indonesian students using serial mediation. *Social Sciences & Humanities Open*, 11, 101213. <https://doi.org/10.1016/j.ssaho.2024.101213>
- Wibowo, A., Narmaditya, B. S., Saptono, A., Effendi, M. S., Mukhtar, S., & Mohd Shafiai, M. H. (2023). Does digital entrepreneurship education matter for students' digital entrepreneurial intentions? The mediating role of entrepreneurial alertness. *Cogent Education*, 10(1), 2221164. <https://doi.org/10.1080/2331186X.2023.2221164>
- Xanthopoulou, P., & Sahinidis, A. (2024). Students' entrepreneurial intention and its influencing factors: A systematic literature review. *Administrative Sciences*, 14(5), 98. <https://doi.org/10.3390/admsci14050098>
- Yousaf, U., Ali, S. A., Ahmed, M., Usman, B., & Sameer, I. (2021). From entrepreneurial education to entrepreneurial intention: A sequential mediation of self-efficacy and entrepreneurial attitude. *International Journal of Innovation Science*, 13(3), 364–380. <https://doi.org/10.1108/IJIS-09-2020-0133>
- Yu, G., Ramayah, T., & Lin, Z. (2025). Toward understanding the role of generative AI in entrepreneurship education: A systematic review. *Computers and Education: Artificial Intelligence*, 9, 100470. <https://doi.org/10.1016/j.caeai.2025.100470>