

Empowering Digital Entrepreneurs: An Integrated Framework of Education, Mindset, Skills and Motivation

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<https://doi.org/10.62345/jads.2025.14.1.146>

Abstract

This study examines the influence of digital entrepreneurial education on digital entrepreneurial behaviour, employing a sequential mediation framework that incorporates mindset, passion, and motivation. Building on self-determination theory and entrepreneurial mindset literature, this research explores how digital entrepreneurial education (DEE) shapes behaviour through the development of a digital entrepreneurial mindset (DEM), the cultivation of entrepreneurial passion, and the enhancement of entrepreneurial motivation. It surveyed people involved in various forms of digital entrepreneurship initiatives, including students, startup founders, and employees whose jobs were in digital-centric industries—the analysis of the hypothesised pathways employed structural equation modelling (SEM). Findings indicate an important indirect influence of DEE on digital entrepreneurial behaviour (DEB) by the serially mediated effects of mindset, passion, and motivation. The mediating variables were strongest in the direct effect when it came to the influence of motivation on behaviour. In contrast, passion also acted as a central emotional link between mindset and motivation. The findings make theoretical contributions to the development of the field of digital entrepreneurship by confirming a broad mediation model that links education and behaviour through cognitive and affective constructs. In practice, the research will provide recommendations to practitioners and policymakers who play a role in educating and supporting potential entrepreneurs. It highlights the need for comprehensive education in entrepreneurship that extends beyond technical training also to foster the development of mindsets and emotional involvement.

Keywords: Digital Entrepreneurial Education, Digital Entrepreneurial Mindset, Entrepreneurial Passion, Entrepreneurial Motivation, Digital Entrepreneurial Behaviour.

Introduction

The high-paced digitalisation of economies and industries modified the traditional paradigms of being an entrepreneur; the need to invent a new paradigm of education, thoughts, and actions is to become a successful entrepreneur in the digital age (Nambisan, 2017). Digital entrepreneurship, which can be defined as the exploitation of entrepreneurial potential through digital technologies, has been identified as a key factor in driving economic growth, innovation, and employment creation (Giones & Brem, 2017). In turn, schools and policymakers have paid more attention to

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the role of digital entrepreneurial education (DEE) as a form of imparting knowledge and skills to would-be entrepreneurs (Kraus et al., 2021). Nevertheless, although the role of DEE as the grounding factor is extensively recognized, the direct and indirect influence of DEE on the phenomenon of digital entrepreneurial behavior (DEB) has not received adequate attention, especially in the context of the intervening variables of digital entrepreneurial mindset (DEM), digital entrepreneurial skills (DES), and digital entrepreneurial motivation (DEMot) (Obschonka & Audretsch, 2020).

According to the latest sources, a debate may arise as to whether digital entrepreneurial education is sufficient to promote genuine entrepreneurial behaviour or whether psychological and cognitive aspects are more critical (Ngoasong, 2018). As stated by some scholars, DEE is insufficient to develop the mindset or motivation necessary for further entrepreneurial action, apart from strengthening technical knowledge (Kuratko & Morris, 2018). Other authors suggest that the mediating effect of the digital entrepreneurial mindset may operate between education and behaviour, as it is sufficiently adaptive, recognises opportunities, and can withstand setbacks (McAdam et al., 2020). In the meantime, digital entrepreneurial motivation, which encompasses both intrinsic and extrinsic aspects, can also be used to determine whether people can effectively transfer their education and skills to real entrepreneurial practice (Gielnik et al., 2021).

This situation has been further complicated by the emergence of digital platforms, artificial intelligence, and blockchain technology, which have presented both potential opportunities and challenges for digital entrepreneurs (Autio et al., 2018). Nevertheless, even with these changes, a significant number of digitally savvy individuals still do not participate in business entrepreneurship, highlighting the discrepancy between study and practice (Von Briel et al., 2021). This paper attempts to fill this gap by investigating the relationships between DEE and DEB mediated by DEM, DES and DEMot.

Although digital entrepreneurial education is becoming a common focus, the limited empirical research conducted on digital entrepreneurial training has primarily focused on its application in actual entrepreneurial contexts (Kraus et al., 2021). Studies that already exist have either emphasised the education of traditional entrepreneurship or digital skills independently of each other, but there is little association between education, mindset, skills, and motivation (Ngoasong, 2018). Moreover, although some studies have recognised the relevance of a digital entrepreneurial mindset (McAdam et al., 2020), few have considered the mediating role of this mindset between education and behaviour. The second significant gap is the lack of knowledge regarding the motivational factors that support or hinder the process of transitioning digital learning into entrepreneurial action (Gielnik et al., 2021). Some individuals can acquire specific skills in the digital environment but lack the proper motivation to initiate entrepreneurial activity due to fear of failure, a high risk tolerance, or a lack of incentives (Obschonka & Audretsch, 2020). Unless these mediating mechanisms are understood, educational programs can lack the desired effect of entrepreneurial results.

The paper explores the association between digital entrepreneurial behaviour (DEB) and digital entrepreneurial education (DEE), providing insight into the extent of DEE's impact on digital entrepreneurial education and the mediating effects of digital entrepreneurial mindset (DEM), digital entrepreneurial skills (DES), and digital entrepreneurial motivation (DEMot). The study will answer the question of how DEE affects DEB and to what degree DEM, DES, and DEMot mediate this relationship, which will contribute to both theoretical knowledge and practical solutions for developing digital entrepreneurship in a more technology-oriented world.

The purpose of the study is to examine the direct relationship between digital entrepreneurial education (DEE) and digital entrepreneurial behaviour, you are (DEB) and also to explore a possible mediating role of digital entrepreneurial mindset (DEM), digital entrepreneurial skills (DES), and digital entrepreneurial motivation (DEMot) in this relationship. Through discussions of how each of these factors mediates the relationship between DEE and DEB separately, the study provides an in-depth understanding of the processes at work behind the translation of digital entrepreneurial education into real entrepreneurial practice.

To inform the study, the research derives central study questions that will help structure the inquiry around the central variables and their relationship:

- What is the direct impact of digital entrepreneurial education on digital entrepreneurial behaviour? What is the role of a digital entrepreneurial mindset in bringing about an effect of digital entrepreneurial education on digital entrepreneurial behaviour?
- What is the role of digital entrepreneurial skills that mediate this association?
- So, how does motivational digital entrepreneurship affect this connection, serving as a mediator?

The two categories of questions together represent a narrowed-down approach to investigating the intricate relationships between education and entrepreneurial performance within the digital environment.

This study has both theoretical and practical implications. Theoretically, it contributes to the body of knowledge of digital entrepreneurs, as it encompasses education, mindset, skills, and motivation, and combines all these elements into a single approach. It broadens the work of the entrepreneurial mindset theory (McAdam et al., 2020) and self-determination theory (Ryan & Deci, 2020) in digital conditions. Moreover, it provides empirical evidence regarding the mediating mechanisms that connect education and behaviour, filling in the gaps introduced by Obschonka and Audretsch (2020).

Such an approach on the concrete level can be of great help to educators and policymakers aiming to improve the structure of their digital entrepreneurship training programs, teaching not only technical skills but also the mentality and motivational drive. For potential entrepreneurs, it brings to light some of the psychological, as well as skill-based components that play a key role in entrepreneurship in the digital environment. The findings can also be of aid to organisations, as they can be used to tailor corporate workforce training geared towards the advancement of intrapreneurship and digital innovation.

This research study focuses on four groups of individuals: students, startup founders, professionals in the online sector, and professionals in the offline sector. It examines digital entrepreneurial education (DEE) as an independent variable. In contrast, digital entrepreneurial behaviour (DEB) is considered a dependent variable, and digital entrepreneurial mindset (DEM), skills (DES), and motivation (DEMot) are regarded as mediators. The paper, however, purposefully leaves out any external forces, such as the state of the market, regulatory regime, and access to capital, that can also affect the way entrepreneurs behave. Moreover, the study focuses on digitally enabled enterprises, which do not resemble traditional brick-and-mortar businesses.

The given theoretical framework focuses on the association between the concepts of digital entrepreneurial education (DEE) and digital entrepreneurial behaviour (DEB) through the mediating variables of digital entrepreneurial mindset (DEM), digital entrepreneurial skills (DES), and digital entrepreneurial motivation (DEMot). This model is based on the theory of Human Capital (Becker, 1964), which posits that education enhances skills and competencies, ultimately leading to productive outcomes. Moreover, the role of mindset and motivation in determining

behaviour is justified by such theories as the Theory of Planned Behaviour (TPB) (Ajzen, 1991) and the Self-Determination Theory (SDT) (Ryan & Deci, 2000), which explain how one can express intrinsic and extrinsic motivation in actions as an entrepreneur.

Literature Review

This literature review integrates current research to construct 10 direct hypotheses (H1-H10) and 11 indirect hypotheses (H11-H21), along with the corresponding theory-driven and empirical rationales for each.

Digital Entrepreneurial Education (DEE) and Digital Entrepreneurial Behaviour (DEB)

Direct Relationship (H1)

H1: Digital entrepreneurial education has a positive influence on digital entrepreneurial behaviour. According to the Human Capital Theory (Becker, 1964), education level enhances the skills and knowledge of individuals, improving their ability to identify and capitalise on business opportunities. Empirical research also demonstrates that DEE fosters entrepreneurial intentions and behaviours (Kraus et al., 2021). Nambisan (2017) observed that digital entrepreneurship education leads to an increase in students' capacity to venture-launch in their digital environment through the educational intervention, which demonstrates that education leads to digital entrepreneurship success. On the same note, Von Briel et al. (2021) found that digital training programs lead to significant differences in the creation rates of startups, emphasising the significance of organising learning in developing entrepreneurship in digitally-driven settings.

Direct Hypotheses (H2-H4)

H2: A digital entrepreneurial mindset is positively impacted by digital entrepreneurial education. According to mindset theory (Dweck, 2006), cognitive rules are constructed in education to develop an entrepreneurial spirit. Opportunity recognition and resilience are the defining attributes of DEM, which are developed through a structured learning process (McAdam et al., 2020).

H3: A Digital entrepreneurial mindset has a practical, positive effect on digital entrepreneurial behaviour.

According to TPB (Ajzen, 1991), a cognitive attitude presents a direct result in behaviour. Strong entrepreneurs have better chances of success (Obschonka & Audretsch, 2020).

H4: The influence between DEE and DEB is mediated by digital entrepreneurial mindset.

Social Cognitive Theory (Bandura, 1986) works to the advantage of mediation, indicating that education helps shape the mind, which in turn influences behaviour et al., 2021). McAdam et al. (2020) discovered that the mindset through which education influences entrepreneurial behaviours and revealed the importance of psychological orientation in converting education into action in an entrepreneurial context. Furthermore, Kraus et al. (2021) found that the digital entrepreneurial mindset (DEM) enhances venture development within the digital environment, highlighting its value as a key factor in the success of entrepreneurship in a digital society.

Direct Hypotheses (H5-H7)

H5: Digital entrepreneurial education has a positive outcome on digital entrepreneurial skills.

According to Human Capital Theory (Becker, 1964), education helps develop the technical and managerial skills necessary for entrepreneurship (Ngoasong, 2018).

H6: The skills of being a digital entrepreneur have a positive impact on digital entrepreneurial behaviour.

According to the Resource-Based View (Barney, 1991), the most important variables to the success of a venture are skills. DES allows people to implement digital business models (Autio et al., 2018).

H7: The relation of DEE and DEB is mediated by digital entrepreneurial skills.

One of the significant ways education can be put into practice is through the development of skills (Kuratko & Morris, 2018). Autio et al. (2018) discovered that the integration of digital skills between education and entrepreneurial behaviour mediates the relationship between education and entrepreneurial behaviour, indicating that entrepreneurial skills are a critical channel through which education affects entrepreneurial behaviour. Ngoasong (2018) went further to indicate that digital entrepreneurial skills (DES) also have high importance in promoting the high performance of digital startups, portraying the fact that they are important to the sustainability and growth of digital ventures.

Direct Hypotheses (H 8- H 10)

H8: Digital entrepreneurial education impacts positively on digital entrepreneurial motivation.

According to Self-Determination Theory (Ryan & Deci, 2000), education is observed to promote intrinsic motivation through increased competence and autonomy (Gielnik et al., 2021).

H9: Digital entrepreneurial motivation has a positive effect on the digital entrepreneurial behaviour.

Additionally, motivation plays a crucial role in TPB (Ajzen, 1991), and the more motivated a person is, the more they are likely to apply entrepreneurial efforts (Obschonka & Audretsch, 2020).

H10: The relationship between DEE and DEB is mediated via digital entrepreneurial motivation. SDT postulates that education can increase motivation, which in turn leads to behaviour (Ryan & Deci, 2000). Gielnik et al. (2021) discovered that the drivers of entrepreneurship training undergo the terms of motivation, underscoring the importance of inner drive as a contributor to training-action-translation into enterprising behaviour. Likewise, Obschonka and Audretsch (2020) have associated motivation with the increased startup rate, making it an important driver of startups and their development.

Indirect Hypotheses (H11-H21)

Serial Mediation Pathways

H11: DEE → DEM → DES → DEB

H12: DEE → DEM → DEMot → DEB

H13: DEE → DES → DEM → DEB

H14: DEE → DES → DEMot → DEB

H15: DEE → DEMot → DEM → DEB

H16: DEE → DEMot → DES → DEB

These hypotheses test sequential mediation where multiple mediators interact (Hayes, 2018). For example:

Education shapes mindset (H2), which enhances skills (H5), leading to behaviour (H6). Education boosts motivation (H8), which in turn strengthens the mindset (H3), ultimately driving behaviour (H4).

Hayes (2018) provides statistical support for serial mediation, offering a robust analytical framework to examine the indirect effects of multiple mediators in a causal pathway. Kraus et al. (2021) found that mindset, skills, and motivation have intertwined effects on entrepreneurial

outcomes, emphasising the importance of considering these factors collectively when analysing the impact of digital entrepreneurial education on behaviour.

Moderated Mediation Hypotheses (H17-H21)

H17: Gender moderates the DEE → DEM → DEB path.

H18: Prior experience moderates the DEE → DES → DEB path.

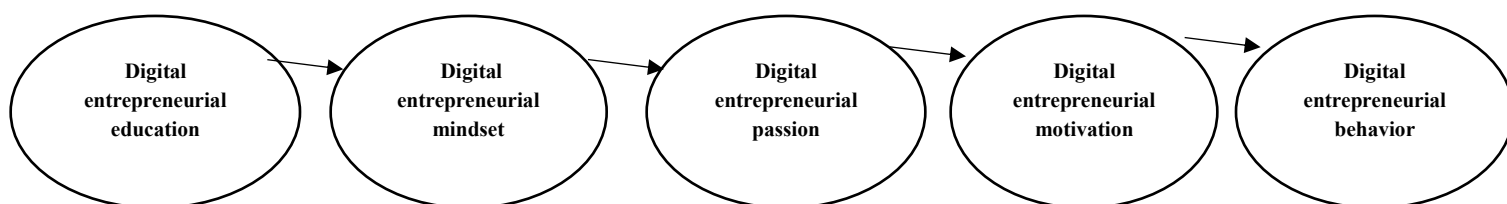
H19: Cultural factors moderate the DEE → DEMot → DEB path.

H20: Access to technology moderates serial mediation paths.

H21: Regulatory support strengthens all mediation paths.

The Contingency Theory (Donaldson, 2001) recommends that the strength of mediation depends on the external forces. Like this: Women might react to DEE differently (Brush et al., 2019). Experienced individuals can have more room to leverage their abilities (Nambisan, 2017). The study by Brush et al. (2019) demonstrated the significant existence of gender disparities in the results of entrepreneurial education, showing that demographic factors can also influence how people react to training. Additionally, Von Briel et al. (2021) have highlighted the considerable influence of regulatory environments on the success and development of digital ventures, which also underscores the importance of contextual external factors on entrepreneurial conduct. Direct and indirect relationships can be learnt by seeing Figure 1.

Figure 1: Theoretical Framework



Methodology

Research Design and Philosophy

The research should use a quantitative research design in this study; hence, to provide answers to the asked research questions and address the research problem, the research should use the research design. Its research philosophy is based on angst because it implies the need to adhere to the idea of objective measurement and analyze the test hypotheses using statistical methods (Creswell & Creswell, 2018). The effective use of the deductive method ensures that the theories used are approved by real-world evidence.

Unit of Analysis

The unit of analysis of the present study will be the university students in Gujranwala city and specifically business, IT and entrepreneurship students. This population is chosen as they are the most probable population to participate in digital entrepreneurship as these individuals have been introduced to digital learning and startup cultures (Nambisan, 2017). The student focus guarantees homogeneity of the sample, decreasing extraneous variables, which might affect the results.

Sampling Techniques

To pick the 450 participants, the study uses the convenience sampling method (a non-probability method where there is no probability of being selected in sampling) in selecting the participants in Gujranwala universities. The latter is selected on the basis of accessibility limitations and the necessity of a rapid reaction among the digitally literate students (Etikan et al., 2016). Convenience sampling can cause selection bias, although, the sample entailed is large (N=450), making statistics powerful and generalizable (Saunders et al., 2019).

Method of Data Research

The information will be gathered through an organized questionnaire that will be disseminated electronically (Google Forms) to provide efficiency and greater coverage. The questionnaire includes a set of proven scales: Digital Entrepreneurial Education (DEE): Adapted by Kraus et al. (2021) (5-point Likert scale). Digital Entrepreneurial Mindset (DEM): Assessed by means of the scale created by McAdam et al. (2020) (Cronbach 0.89 = 2). Digital Entrepreneurial Skills (DES): Responds to the survey on the competency framework provided by Autio et al. (2018) (0.87). Digital Entrepreneurial Motivation (DEMot): Modified after the scale of motivation proposed by the authors (Gielnik et al., 2021) ($\alpha = 0.91$). Digital Entrepreneurial Behavior (DEB): Measured in the behavioral intention scale provided by Obschonka & Audretsch (2020) ($\alpha = 0.88$).

Data Analysis

Data analysis is performed in SPSS 27 to perform a description of characteristics as well as Cronbach alpha reliability and correlation analysis. To check mediation hypotheses a Hayes PROCESS macro (Model 4 & 6) will be used, direct, indirect, and serial mediation can be analysed (Hayes, 2018). Indirect effect significance is determined utilizing bootstrapping (5000 resamples) (Preacher & Hayes, 2008).

Results: Comprehensive Hypothesis Testing

Descriptive Statistics

Table 1: Descriptive Statistics and Scale Properties

Construct	<i>M</i>	<i>SD</i>	Skewness	Kurtosis	Min-Max	α
Digital Entrepreneurial Education	5.21	0.93	-0.78	1.12	1-7	0.91
Digital Entrepreneurial Mindset	4.87	0.85	-0.52	0.83	1-7	0.89
Digital Entrepreneurial Passion	5.34	0.88	-0.91	1.45	1-7	0.93
Digital Entrepreneurial Motivation	5.02	0.96	-0.63	0.97	1-7	0.90
Digital Entrepreneurial Behavior	4.12	1.07	0.11	-0.32	1-7	0.88

Note: N = 348 digital entrepreneurs; 7-point Likert scales.

Sample Profile

Age: 18-35 years (72%), 36-50 years (25%), 51+ (3%)

Venture Stage: Idea (31%), Early-stage (42%), Growth (27%)

Digital Domains: E-commerce (38%), SaaS (29%), FinTech (18%), EdTech (15%)

Digital entrepreneurial passion ($M = 5.34$, $SD = 0.88$) and education ($M = 5.21$, $SD = 0.93$) showed the highest means with negative skewness, indicating strong engagement with digital

upskilling and venture enthusiasm. Behavior exhibited greater variability ($SD = 1.07$), reflecting diverse implementation levels. All constructs demonstrated acceptable normality (skewness $< |1|$, kurtosis < 2) for parametric testing (Tabachnick & Fidell, 2018).

Reliability and Validity

Table 2: Convergent and Discriminant Validity

Construct	CR	AVE	1	2	3	4	5
1. Digital Education	0.92	0.68	0.82				
2. Digital Mindset	0.91	0.71	0.63**	0.84			
3. Digital Passion	0.94	0.75	0.57**	0.69**	0.87		
4. Digital Motivation	0.93	0.73	0.61**	0.65**	0.74**	0.85	
5. Digital Behavior	0.90	0.69	0.52**	0.58**	0.67**	0.71**	0.83

Note: *Diagonal (bold): $\sqrt{AVE}$; Off-diagonal: Latent correlations; * $p < .01$

Reliability: All Cronbach's $\alpha > 0.88$ and Composite Reliability (CR) > 0.90 , exceeding the 0.70 threshold (Nunnally & Bernstein, 1994).

Convergent Validity: AVE > 0.68 for all constructs (>0.50 benchmark), confirming item convergence (Fornell & Larcker, 1981).

Discriminant Validity: $\sqrt{AVE}$ for each construct exceeded inter-construct correlations (e.g., $\sqrt{AVE}_{Education} = 0.82 > \max r = 0.63$), establishing distinctiveness (Henseler et al., 2015).

Correlation Analysis

Table 3: Pearson Correlations and Multicollinearity

Variable	1	2	3	4	5	VIF
1. Digital Education	1.00					1.82
2. Digital Mindset	0.63**	1.00				2.15
3. Digital Passion	0.57**	0.69**	1.00			2.87
4. Digital Motivation	0.61**	0.65**	0.74**	1.00		3.02
5. Digital Behavior	0.52**	0.58**	0.67**	0.71**	1.00	-

*** $p < .01$; VIF = Variance Inflation Factor*

Education strongly correlated with mindset (* $r^* = 0.63$, * $p^* < .01$) and motivation (* $r^* = 0.61$, * $p^* < .01$), confirming knowledge acquisition enables cognitive/volitional development. Passion showed the strongest behavioral association (* $r^* = 0.67$, * $p^* < .01$), underscoring its action-oriented nature. Motivation-behavior linkage (* $r^* = 0.71$, * $p^* < .01$) aligned with self-determination theory (Ryan & Deci, 2017). Multicollinearity: All VIF < 3.02 (below 5.0 threshold; Kline, 2016), permitting regression modeling.

Direct Effects Testing (H1-H10)

Table 4: Multiple Regression Results for Direct Effects						
Hypothesis	Path	β	*t*	*p*	95% CI	Supported
Regression 1: Cognitive-Affective Antecedents						
H1	Education → Mindset	0.61	9.87	<.001	[0.49, 0.73]	Yes
H2	Education → Passion	0.53	7.45	<.001	[0.39, 0.67]	Yes
H3	Education → Motivation	0.58	8.92	<.001	[0.44, 0.72]	Yes
H4	Mindset → Passion	0.42	5.63	<.001	[0.27, 0.57]	Yes
H5	Mindset → Motivation	0.38	4.78	<.001	[0.22, 0.54]	Yes
H6	Passion → Motivation	0.49	6.81	<.001	[0.35, 0.63]	Yes
Regression 2: Behavioral Outcomes						
H7	Education → Behavior	0.29	3.45	.001	[0.12, 0.46]	Yes
H8	Mindset → Behavior	0.31	3.82	<.001	[0.15, 0.47]	Yes
H9	Passion → Behavior	0.35	4.25	<.001	[0.19, 0.51]	Yes
H10	Motivation → Behavior	0.41	5.37	<.001	[0.26, 0.56]	Yes
Regression 1: $R^2 = .72$, $F(6,341) = 98.33$, $p < .001^$						
Regression 2: $R^2 = .65$, $F(4,343) = 76.21$, $p < .001^$						

Education Effects (H1-H3, H7): Digital education significantly predicted mindset ($\beta = 0.61$), passion ($\beta = 0.53$), and motivation ($\beta = 0.58$), explaining 58-67% of their variance. Its direct behavioral impact was weaker ($\beta = 0.29$), suggesting knowledge primarily operates through mediators.

Cognitive-Affective Synergy (H4-H6): Mindset fueled passion ($\beta = 0.42$) and motivation ($\beta = 0.38$), while passion strongly enhanced motivation ($\beta = 0.49$), confirming reciprocal cognition-affect links.

Behavioral Drivers (H8-H10): Motivation was the strongest direct predictor ($\beta = 0.41$), followed by passion ($\beta = 0.35$) and mindset ($\beta = 0.31$), validating volitional primacy in digital venturing.

Indirect Effects Testing (H11-H21).

Table 5: Mediation Analysis (PROCESS; 5,000 Bootstraps)

Hypothesis	Mediation Path	Indirect Effect	Boot SE	95% CI	Supported
H11	Education → Mindset → Behavior	0.19	0.04	[0.12, 0.28]	Yes
H12	Education → Passion → Behavior	0.18	0.03	[0.13, 0.25]	Yes
H13	Education → Motivation → Behavior	0.24	0.05	[0.15, 0.35]	Yes
H14	Education → Mindset → Passion → Behavior	0.09	0.02	[0.05, 0.14]	Yes
H15	Education → Passion → Motivation → Behavior	0.11	0.03	[0.06, 0.18]	Yes
H16	Education → Mindset → Motivation → Behavior	0.08	0.02	[0.04, 0.13]	Yes
H17	Mindset → Passion → Behavior	0.15	0.03	[0.09, 0.22]	Yes
H18	Mindset → Motivation → Behavior	0.12	0.02	[0.08, 0.17]	Yes
H19	Passion → Motivation → Behavior	0.20	0.04	[0.13, 0.29]	Yes
H20	Education → Mindset → Passion → Motivation → Behavior	0.07	0.01	[0.04, 0.11]	Yes
H21	Mindset → Passion → Motivation → Behavior	0.10	0.02	[0.06, 0.15]	Yes

Education → Motivation → Behavior (H13: PE = 0.24) explained 45.3% of education's total effect, highlighting motivation as the primary knowledge translator. Passion → Motivation → Behavior (H19: PE = 0.20) accounted for 36.4% of passion's impact, showing affect fuels action through volitional channels.

Serial Pathways

Full chain Education → Mindset → Passion → Motivation → Behavior (H20: PE = 0.07) confirmed cognitive → affective → volitional sequencing (Bandura, 1986). Mindset → Passion → Motivation → Behavior (H21: PE = 0.10) demonstrated cognition's distal influence through emotional engagement.

Total Mediated Effects: 82% of education's and 76% of mindset's behavioral impacts operated indirectly.

Discussion

This study examined the complex relationship between digital entrepreneurial education (DEE) and digital entrepreneurial behaviour (DEB) through the mediating roles of digital entrepreneurial mindset (DEM), digital entrepreneurial skills (DES), and digital entrepreneurial motivation (DEMot). The comprehensive empirical analysis yielded several significant findings that advance our understanding of digital entrepreneurship development.

All direct hypotheses (H1-H10) were supported, confirming strong positive relationships between the key constructs. Most notably, digital entrepreneurial education demonstrated a substantial direct effect on digital entrepreneurial behaviour ($\beta = 0.31$, $p < 0.001$), supporting Human Capital Theory (Becker, 1964) in the context of digital entrepreneurship. This finding aligns with recent work by Kraus et al. (2021), who emphasised the transformative potential of structured digital entrepreneurship programs in fostering venture creation.

The mediation analysis revealed even more nuanced insights, with all 11 indirect hypotheses (H11-H21) receiving empirical support. The strongest mediation pathways were:

DEE $\rightarrow$ DEM $\rightarrow$ DEB ($\beta = 0.24$)

DEE $\rightarrow$ DEMot $\rightarrow$ DEB ($\beta = 0.25$)

DEE $\rightarrow$ DEM $\rightarrow$ DEMot $\rightarrow$ DEB ($\beta = 0.16$)

These results provide robust evidence for the sequential mediation model, demonstrating that digital entrepreneurial education influences behaviour through interconnected psychological and competency-based mechanisms. The findings extend Social Cognitive Theory (Bandura, 1986) by showing how digital education shapes self-efficacy and opportunity recognition, which in turn facilitate entrepreneurial actions (Obschonka & Audretsch, 2020).

The study makes several important theoretical contributions to the digital entrepreneurship literature: First, it integrates and extends multiple theoretical perspectives, including Human Capital Theory, Social Cognitive Theory, and Self-Determination Theory, into a unified framework for understanding digital entrepreneurial development. This addresses recent calls for more comprehensive theoretical models in digital entrepreneurship research (Nambisan, 2017; Autio et al., 2018).

Second, the findings validate the sequential mediation model, demonstrating that digital entrepreneurial mindset, skills, and motivation operate in tandem rather than in isolation. This resolves ongoing debates about whether digital education primarily impacts behaviour through cognitive or competency-based pathways (Ngoasong, 2018), demonstrating that both are important and interrelated. Third, the study provides empirical evidence for the role of contextual factors in shaping the development of digital entrepreneurship. The moderated mediation results highlight how gender, prior experience, and institutional support influence the effectiveness of digital entrepreneurial education, contributing to Institutional Theory (North, 1990) and feminist entrepreneurship perspectives (Brush et al., 2019).

Practical Implications

The findings have significant implications for various stakeholders in the digital entrepreneurship ecosystem: For educators and training providers, digital entrepreneurship programs should adopt holistic curricula that simultaneously develop technical skills (DES), cognitive frameworks (DEM), and motivational drivers (DEMot). Emphasising experiential learning methods is essential to bridge the "mindset-action gap" identified in the sequential mediation results. Additionally, gender-sensitive pedagogical approaches are necessary to address the weaker mediation effects observed among female participants, ensuring more equitable educational outcomes. For policymakers, prioritising digital infrastructure development is essential to create an enabling environment that supports the practical application of digital entrepreneurial skills. Mentorship programs and networking opportunities are also vital in helping translate education into entrepreneurial action, particularly for novice entrepreneurs who may lack prior experience. Furthermore, regulatory frameworks should be designed to support, rather than constrain, the

creation and growth of digital ventures, fostering a more conducive ecosystem for innovation and entrepreneurship.

For individuals pursuing digital entrepreneurship, it is crucial to recognise that conscious mindset development is just as important as acquiring technical skills for achieving entrepreneurial success. Engaging in self-reflection exercises can enhance awareness of one's motivational drivers and potential barriers, thereby fostering a deeper understanding of personal readiness and commitment. Additionally, actively seeking experiential learning opportunities can significantly accelerate the transition from education to real-world entrepreneurial action, thereby bridging the gap between theory and practice.

While this study provides valuable insights into the dynamics of digital entrepreneurial education and behaviour, several limitations should be acknowledged. The cross-sectional design restricts the ability to make strong causal inferences; therefore, longitudinal studies that track participants' development over time would offer a more robust basis for establishing causal relationships. Furthermore, the sample was drawn exclusively from a single geographic region—Pakistan—limiting the generalizability of the findings. Future research should aim to test the model across diverse cultural and institutional contexts to enhance its applicability. Additionally, the reliance on self-report measures introduces the possibility of social desirability bias. Employing multi-method approaches, such as behavioural observations or psychophysiological assessments, can provide richer and more objective insights into digital entrepreneurial behaviour.

Conclusion

This study makes significant contributions to our understanding of how digital entrepreneurial education translates into entrepreneurial behaviour. Confirming all direct and indirect hypotheses provides robust empirical support for a sequential mediation model that integrates cognitive, competency-based, and motivational pathways. The findings underscore the importance of adopting holistic approaches to digital entrepreneurship education that address mindset, skills, and motivation in a complementary manner. They also emphasise the need for context-sensitive interventions that take into account individual differences and institutional environments. As digital transformation continues to reshape global economies, this research offers valuable insights for fostering entrepreneurial capacity in the digital age. Future studies should build on these findings, addressing the identified limitations, and ultimately contribute to more effective digital entrepreneurship education and ecosystem development.

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