

Enhancing entrepreneurial self-efficacy development through teaching quality, learning methods, and university support systems

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ABSTRACT

Objective: The objective of the article is to identify how universities influence students' entrepreneurial self-efficacy (ESE) through teaching quality, learning methods, and external engagement activities, with a focus on the mediating role of university support systems.

Research Design & Methods: The study employed a quantitative research design, using structural equation modelling to analyse data from 1 246 students across 11 public and technical universities in Ghana.

Findings: The results show that teaching quality and learning methods directly enhance ESE, while external engagement activities exert their influence indirectly through university support systems. The strongest contributor to ESE is university support systems, followed by teaching quality, learning methods, and external engagement. The study highlights the importance of an integrated teaching approach reinforced by institutional support and external engagement for fostering ESE.

Implications & Recommendations: Universities should strengthen their support systems and adopt teaching methods that combine experiential learning with external engagement activities to enhance students' ESE. Policymakers and educators should prioritise institutional frameworks that facilitate these interactions.

Contribution & Value Added: The article contributes to self-efficacy and social cognitive career theories by empirically validating the mediating role of university support systems. It also enriches the literature on entrepreneurship education by providing evidence from an emerging economy context (Ghana), where such studies are limited.

Article type: research article

Keywords: entrepreneurship education; entrepreneurial self-efficacy; external engagement activities; learning methods; teaching quality; university support systems

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INTRODUCTION

Sub-Saharan Africa (SSA) continues to grapple with persistently high youth unemployment, a pressing socio-economic concern exacerbated by a youthful demographic profile, with nearly half the population below 20 years of age (African Development Bank, 2025). Despite this demographic dividend, many African economies struggle to absorb young people into productive employment, with youth unemployment worsening in the post-COVID-19 period (International Labour Organization, 2024). Ghana exemplifies this challenge, recording youth unemployment of about 12% alongside underemployment rates exceeding 50%, prompting calls for urgent policy interventions (World Bank, 2020). In this context, scholars increasingly view entrepreneurship as a sustainable pathway for job creation, particularly within economies dominated by informal small-scale enterprises (Okoro *et al.*, 2022; Tuffour *et al.*, 2024; 2025).

To address youth unemployment, African governments have implemented various entrepreneurship promotion initiatives. In Ghana, these include the National Youth Employment Agency, the National Entrepreneurship and Innovation Programme, and the Nation Builders Corps (Jumpah *et al.*, 2020). Similar interventions have emerged in other African countries, including Tunisia, Egypt, and Morocco, particularly following the Arab Spring (Prince *et al.*, 2018). While these policy efforts underscore the strategic importance of entrepreneurship, their effectiveness depends largely on the capacity of educational institutions to equip learners with the skills, confidence, and support required to pursue entrepreneurial careers.

Indeed, universities are uniquely positioned to nurture entrepreneurial mindsets by combining knowledge acquisition with skills development, creativity, and resilience building (Nyukorong, 2022). However, limiting entrepreneurship education (EntEdu) to classroom-based content delivery has proven insufficient in addressing Africa's unemployment challenges (Okoro *et al.*, 2022). For EntEdu to meaningfully influence students' entrepreneurial behaviour and entrepreneurial self-efficacy (ESE), universities must adopt a more holistic approach that integrates teaching quality, experiential learning methods, institutional support systems, and engagement with external stakeholders. Scholars have identified practical business seminars, mentorship programmes, innovation hubs, and business incubators as critical mechanisms through which theoretical knowledge can transform into market-ready solutions (Agyapong, 2020; Oliver & Oliver, 2022).

Despite growing investments by some Ghanaian universities in entrepreneurship hubs and support structures, evidence suggests that many students still lack the confidence to initiate entrepreneurial ventures due to limited institutional support and inadequate exposure to real-world business challenges (Shahzad *et al.*, 2021). This prompts a core question within entrepreneurship education research: how effective are university-led entrepreneurial initiatives in strengthening students' entrepreneurial self-efficacy? Resolving this issue is essential for assessing universities' contributions to sustainable employment creation and progress towards Sustainable Development Goal 8, particularly Target 6, which focuses on youth employment, education, and skills development (United Nations, 2015).

Prior research in EntEdu predominantly examined the direct influence of teaching quality, learning methods, and curriculum design on students' entrepreneurial intentions and self-efficacy (Iwu *et al.*, 2021; Mensah-Williams & Derera, 2024). Although these studies offer important insights, they often position university support systems as background conditions rather than as active mechanisms shaping entrepreneurial outcomes. Consequently, the mediating role of university support systems in linking teaching quality and learning methods to students' ESE remains underexplored, particularly in SSA. This gap limits a comprehensive understanding of how university-based entrepreneurial ecosystems function as integrated systems rather than as isolated components.

To address this research gap, we explored how teaching quality (TQ), learning methods (LM), university support (US) systems, and external engagement (EE) activities jointly influence students' ESE. Drawing on data from 1 246 students across 11 public and technical universities in Ghana, we moved beyond content-focused evaluations of EntEdu by assessing the robustness of institutional interventions and support structures. In doing so, we respond to recent calls for more nuanced analyses of EntEdu that capture the quality of instruction, experiential learning, and ecosystem-level support (Duong *et al.*, 2024).

Theoretically, this research draws upon Bandura's self-efficacy framework and the social cognitive career perspective, both of which highlight how contextual supports, experiential learning, and interpersonal dynamics collectively influence the formation of career-oriented cognitions and actions. This investigation contributes distinctively by focusing on the intermediary function of institutional support structures within universities, specifically how such systems channel the effects of teaching quality and learning methods on ESE. By empirically testing this mediation within an African context, the study extends EntEdu literature beyond predominantly Western and direct-effect models.

By focusing on Ghana, the study provides contextually grounded insights relevant to other emerging economies facing similar youth unemployment challenges. We expected the findings to inform university administrators, policymakers, and other stakeholders on how to strengthen entrepreneurial ecosystems within higher education institutions to produce job creators rather than job seekers.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Theoretical Review

Self-efficacy Theory

Bandura's (1977) self-efficacy theory describes the development of self-efficacy by individuals through four major factors: mastery experiences, vicarious experiences, social persuasion, and physiological state. Theoretically, self-efficacy is domain-specific (Lent & Brown, 2019). In the context of entrepreneurship training, ESE refers to students' confidence in their abilities to undertake entrepreneurial tasks such as opportunity search, strategic preparation, resource mobilisation, and risk management (Al-Qadasi *et al.*, 2023). High self-efficacy makes one more likely to participate in entrepreneurial activities, work more diligently, or persevere in spite of challenges (Newman *et al.*, 2019).

In EntEdu, self-efficacy sources manifest through mastery experiences (business planning, pitch presentations), vicarious experiences (guest entrepreneurs, case studies), and social persuasion (instructor feedback, peer encouragement) (Akhtar *et al.*, 2022; Newman *et al.*, 2019). The theory's triadic reciprocal determinism explains how TQ and US, as environmental factors, interact with LM to foster ESE development, while universities manage psychological states during entrepreneurial learning (Aboobaker & Zakkariya, 2023).

Social Cognitive Career Theory

Drawing on Bandura's foundational work on self-efficacy, Lent *et al.* (1994, 2000) developed the social cognitive career theory (SCCT) to explain the cognitive and motivational mechanisms underlying the development of vocational interests, career choice processes, and performance-related outcomes. The theory emphasises the interaction between personal beliefs, learning experiences, and environmental conditions in shaping career trajectories. Notably, SCCT is particularly relevant to EntEdu because it explains how educational contexts influence ESE, beliefs about prospective outcomes, and career-directed actions (Brown & Lent, 2023).

Social cognitive career theory includes three interconnected models: interest development, choice-making, and performance (Lent *et al.*, 2000). The interest development model describes how experiential inputs help build self-efficacy cognitions and performance expectations, which serve as precursors to vocational interest formation (Wang *et al.*, 2022). In university settings, teaching quality and learning methods play a key role in providing mastery experiences, social persuasion, and observational learning that bolster students' ESE and interests (Duong *et al.*, 2024). Therefore, well-designed entrepreneurship curricula, experiential learning activities, and problem-based pedagogies are crucial mechanisms through which universities promote entrepreneurial aspirations.

The choice-making framework emphasises the function of external enabling factors and obstacles in transforming interests into defined career objectives and purposeful actions (Brown & Lent, 2023). Within EntEdu settings, institutional support infrastructure represents critical contextual enablers that promote entrepreneurial decision-making (Boahen *et al.*, 2023; Tuffour *et al.*, 2025). The infrastructure manifests through venture incubation facilities, structured mentoring schemes, dedicated innovation spaces, and resource mobilisation channels. External engagement with industry partners and role models further reinforces these choices by providing feedback, validation, and exposure to real-world entrepreneurial challenges (Akinlolu *et al.*, 2023).

Finally, the performance model explains how self-efficacy and outcome expectations guide sustained effort and achievement in career-related activities (Lee *et al.*, 2021). Applied to entrepreneurship, this model underscores how supportive university environments enhance students' capacity to transform entrepreneurial intentions into effective entrepreneurial behaviour. Accordingly, SCCT provides a robust theoretical lens for examining how teaching quality and learning methods influence ESE, both directly and indirectly through university support systems, an emphasis central to this study.

Entrepreneurial Efficacy Development: Teaching Quality and Learning Methods

Empirical evidence shows that TQ is one of the factors that play a significant role in ESE development, with research establishing its positive relationship with students' self-efficacy beliefs (Luo *et al.*, 2022; Wu *et al.*, 2022). However, researchers have not agreed on a common definition for TQ. Some authors point to interactive teaching practices and learning environments (Yang *et al.*, 2021), while others underscore state-of-the-art course content design, using formative assessments (Zhong, 2023). Authors like Iwu *et al.* (2021) often view improved entrepreneurship instruction as requiring critical thinking techniques, allowing students to apply theoretical entrepreneurship concepts in practice. Moreover, Donaldson and Villagrasa (2024) view TQ as a well-designed entrepreneurship course that combines theoretical foundations with interactive learning using business simulations or cases. This article proposes that the role of TQ must be explored by studying students' behaviour in initiating or continuing entrepreneurial activities that become real businesses.

Entrepreneurship LM has shifted from instructor-focused to learner-centred pedagogy, emphasising experiential learning through business simulations, startup incubators, and competitions (Boahen *et al.*, 2023; Donaldson & Villagrasa, 2024; Vivekananth *et al.*, 2023). Experiential approaches significantly improve ESE compared to traditional case-study methods (Abd Rahim *et al.*, 2022; Anwar & Abdullah, 2021), building resilience and creativity while enabling students to experiment with real-world business ideas (Wang *et al.*, 2023). These pedagogical techniques allow risk experimentation with acceptable consequences, while industry-practitioner linkages facilitate innovative ideas and enhance self-efficacy (Akinlolu *et al.*, 2023; Iwu *et al.*, 2021). Mentorship programmes further strengthen industry networks, enabling students to develop requisite entrepreneurial skills.

Notably, the general assertion that instructional quality influences ESE constitutes enough justification for testing the relationship between teaching quality and ESE. Again, sufficient empirical evidence exists to support the assertion that a variety of teaching delivery settings improve ESE. Based on these empirical data, we hypothesised:

H1: Teaching quality positively influences ESE among university students.

H2: Learning methods directly affect ESE in higher education settings.

Universities' External Stakeholder Engagements and Entrepreneurial Self-efficacy

Several studies demonstrate that EE enhances ESE by offering students practical exposure, professional affirmation, and interaction with entrepreneurial role models (Andayani *et al.*, 2020; Atta-Owusu & Fitjar, 2022). Institutions maintaining robust partnerships with industry, alumni, and public agencies can better create experiential opportunities that let students translate theoretical learning into real-world application, thereby reinforcing ESE (Agyapong, 2020; Hassan, 2024). However, empirical findings on the direct impact of EE on ESE are not entirely consistent. While some studies report strong positive effects (Andayani *et al.*, 2020), others find weaker or context-dependent relationships, particularly where external engagements are short-term, informal, or poorly integrated into academic programmes (Atta-Owusu & Fitjar, 2022). These contradictions suggest that EE does not uniformly translate into enhanced self-efficacy unless it is structured, supported, and reinforced by institutional mechanisms.

Notably, scholars argue that the efficacy of EE rests on the extent to which universities provide complementary support structures, such as coordination units, mentoring frameworks, and follow-up mechanisms, that enable students to reflect on and internalise their external experiences (Al-Qadasi *et al.*, 2023). Without such support, external engagements may raise awareness of entrepreneurial challenges without enhancing students' confidence to pursue entrepreneurial action. This perspective provides a plausible explanation for why some studies observe direct effects of EE on ESE, while others do not. Nonetheless, given the substantial body of evidence highlighting the potential benefits of external engagement on ESE, we hypothesised:

H3: External engagement activities enhance students' ESE.

Universities' Support Systems and Entrepreneurial Self-efficacy

There has been a growing interest in understanding the role of university support systems in entrepreneurial development. Besides linking students to external partners, universities often create internal opportunities for students to boost their entrepreneurial capabilities. These internal support systems include, among other things, business incubators and entrepreneurship centres, financial support schemes, and effective entrepreneurship curricula (Agyapong, 2020; Dharmanegara *et al.*, 2022). Moreover, support systems like ideation, business plan training, and market research equip students with skills to navigate entrepreneurial challenges (Al-Fattal, 2021). In a study of nearly 14 000 Chinese graduates, Lu *et al.* (2021) found that strong university support systems positively affect students' ESE.

Beyond the provision of physical resources, researchers report that universities' social and psychological support structures influence ESE (Padi *et al.*, 2022; Su *et al.*, 2021). For example, where students can engage with faculty and peers through these intangible support systems, critical entrepreneurial cultures (such as innovation and risk-taking) emerge (Padi *et al.* 2022). Yesmin *et al.*'s (2024) examination of university support frameworks concluded that university community engagements enhance students' entrepreneurial abilities. Wang and Huang (2019) confirmed the relationship between entrepreneurial success and acting upon university support structures, which are theorised to affect entrepreneurial intention through various psychological channels. Dharmanegara *et al.* (2022) confirmed that such support structures exert a significant influence on fostering ESE in an educational setting.

Based on this compelling empirical evidence across diverse educational contexts and methodologies, we argue that universities with robust support structures create a psychological safety net for entrepreneurs to thrive. Thus, both physical and intangible support systems are critical for sharpening students' ESE. Therefore, we hypothesised:

H4: University support positively influences ESE.

Relationship Between Teaching Quality, Learning Methods, and External Engagement

Empirical evidence shows a strong link between the quality of teaching and support structures within universities. For instance, Farooqi *et al.*'s (2023) examination of 686 students found that teaching quality in universities influences the allocation of institutional resources and support systems. This finding aligns with the quantitative analysis by Toledo *et al.* (2022), which indicates that structured teaching support programmes provided greater overall institutional assistance to 114 university teachers.

Similarly, Farooqi *et al.*'s (2023) study of university faculty members revealed that good teaching skills correspond to higher levels of administrative support. Furthermore, Li and Austria (2023) demonstrate that universities with a well-structured teaching quality management programme provides better faculty support. Zhong (2023) and Farooqi *et al.* (2023) corroborated these findings. They showed that the management of teaching quality directly affects university support systems through funding and infrastructure development. This evidence informed our hypothesis:

H5: Teaching quality positively influences university support.

Research indicates a strong relationship between university learning systems and support structures. For example, Gaspar Pacheco *et al.* (2024) show that innovative learning methods supported by universities increase faculty participation and institutional support. A mixed-methods study of business students found that integrated learning approaches reinforce university support mechanisms (Pugh *et al.*, 2021). Furthermore, Descals-Tomás *et al.* (2021) affirm that learning methods backed by faculty support enhance university support, suggesting that problem-based learning methodologies are engines for strengthening university-support systems. These findings laid the foundation for the next hypothesis:

H6: Learning methods positively influence university support.

Meanwhile, studies show the pivotal role of external engagement in universities' support systems. Descals-Tomás *et al.* (2021) demonstrate that external engagements like family support enhance institutional support. Yang *et al.* (2021) found that faculty support and external engagement activities improve university support structures. According to Atta-Owusu and Fitjar (2022), external

engagement enhances university support through the creation of avenues for funding and knowledge exchange.

Moreover, Atta-Owusu and Fitjar (2023) suggest that external engagement in the form of university partnerships directly enhances institutional support systems; their study of European universities found that structured external engagement programmes were critical for strengthening institutional support. Again, empirical evidence from Law *et al.* (2021) indicates that stronger external engagement frameworks enhance the sustainability of institutional support. Based on this evidence, we hypothesised:

H7: External engagement positively influences university support.

Relationship Between Teaching Quality, Learning Methods, External Engagement, and University Support Systems

The function of university support systems in entrepreneurial training has received increasing attention. Scholarship revealed that educational institutions' support frameworks have a significant impact on entrepreneurial success (Padi *et al.*, 2022). Lu *et al.* (2021) validated that strong university support systems positively impact students' ESE and orientation, specifically through structured institution frameworks. Vivekananth *et al.* (2023) corroborated this and claimed that institutional support frameworks play a critical role in fostering self-efficacy through both instructional design and the delivery of support services. Supplementary evidence from Su *et al.* (2021) affirms that university support systems indirectly influence entrepreneurial behaviour, thereby improving students' ESE.

Su *et al.* (2021) confirmed a positive relationship between entrepreneurial success and university support. These scholars found that entrepreneurial intentions are influenced by institutional support structures through a variety of cultural and psychological channels. Moreover, Aboobaker *et al.* (2023) confirmed that both institutional and family support structures significantly contribute to ESE. Wu *et al.* (2022) supplement these findings by indicating that supporting structures and professional training have significant effects on ESE development.

Past studies have confirmed direct relationships among ESE, external involvement, learning approaches, and teaching quality. Meanwhile, the intermediary role of university support in these relationships remains relatively underexplored. In an attempt to bridge the literature gap, we aimed to understand how university support structures mediate such relationships. Drawing on the theoretical framework and empirical insights reviewed, we hypothesised:

H8a: University support mediates the relationship between teaching quality and ESE.

H8b: University support mediates the relationship between learning methods and ESE.

H8c: University support mediates the relationship between external engagement and ESE.

Conceptual Framework

Figure 1 presents our research framework examining the relationships between TQ, LM, EE, US, and ESE in higher education. The framework shows direct paths (H1-H3) from TQ, LM, and EE to ESE. It also depicts how TQ, LM, and EE influence US (H5-H7), and how US affects ESE (H4). The model further illustrates the intermediary role of the US between the independent variables (TQ, LM, EE) and ESE through hypotheses H8a, H8b, and H8c, providing a structure for understanding ESE development among Ghanaian university students.

RESEARCH METHODOLOGY

Research Context

Ghana's entrepreneurial landscape provides a unique context for studying ESE development, given high youth and graduate unemployment (World Bank, 2020). Government policies like the National Entrepreneurship and Innovation Programme aim to foster entrepreneurial mindsets and transition from a job-seeking to a job-creating economy (Jumpah *et al.*, 2020). Universities play a critical role, with entrepreneurship courses becoming mandatory across programmes (Mensah-Williams & Derera, 2024).

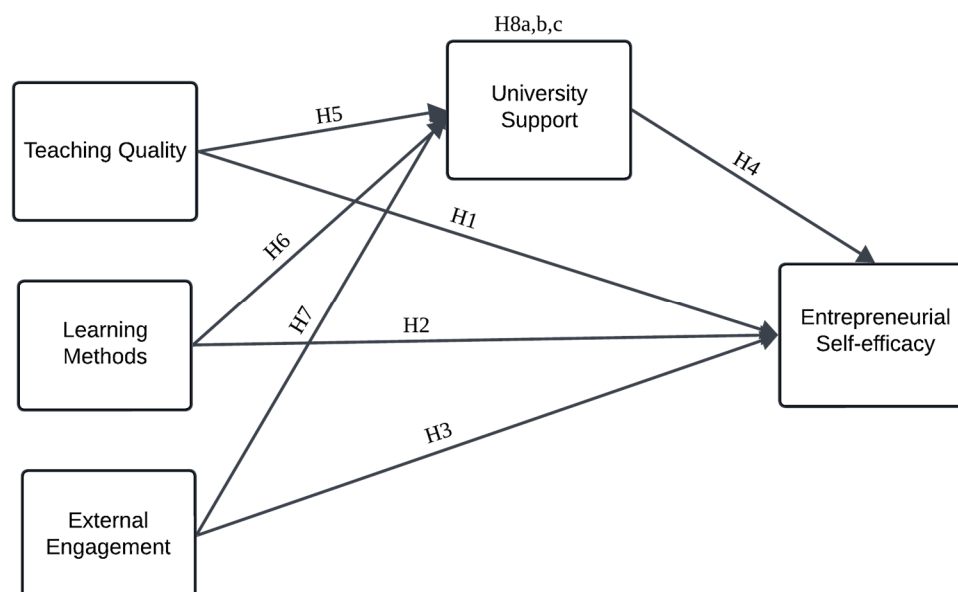


Figure 1. Conceptual framework

Source: own elaboration.

Sampling and Measurement Instruments

Methodologically, the study followed a quantitative design, with data sourced from students attending 11 public and technical tertiary institutions in Ghana over three months (June-August 2024) (Table 1A). To maintain a fair representation of the research respondents, we organised the population into three geographical clusters (Southern Belt, Middle Belt, and Northern Belt). We gathered data using a stratified random sampling technique. Within each geographical cluster, we established sampling quotas and identified potential participants randomly.

Table 1A. Participating public and technical universities by geographical region

No.	Name of Institution	Cluster	Sample
1	University of Ghana	Southern	83
2	University of Cape Coast	Southern	233
3	University of Education, Winneba	Southern	69
4	Cape Coast Technical University	Southern	133
5	Kwame Nkrumah University of Science and Technology	Middle	210
6	University of Energy and Natural Resources	Middle	97
7	Sunyani Technical University	Middle	110
8	University of Development Studies	Northern	73
9	Dombo University of Business and Integrated Development Studies	Northern	121
10	Tamale Technical University	Northern	97
11	Dr Hilla Limann Technical University	Northern	20
Total:			1 246

Source: own study of data from fieldwork in 2024.

The diverse sample encompasses both undergraduate and postgraduate students at various academic levels. The informants were students who had completed formal entrepreneurship courses and had gained practical experience through external engagement and other university activities such as internships, industry collaborations, and mentorship programmes. This sampling technique ensured that respondents could meaningfully evaluate both theoretical instruction and practical application aspects of EntEdu at their institutions. This diversity in institutional representation is in line with similar studies in developing economies (Wang *et al.*, 2023) and gives a holistic picture of EntEdu in Ghana's higher education system. From the initial distribution of 1 500 questionnaires, we

analysed 1 246 valid responses, representing an 83.1% response rate, which exceeds the threshold recommended by Hair *et al.* (2017) for structural equation modelling studies. We surveyed all constructs using standardised scales (Table 1B) with a seven-point Likert scale (1 = strongly disagree, 7 = strongly agree), with mean scores ranging from 4.618 to 4.840.

Table 1B. Measurement instruments

Constructs	Adapted Scale	References
ESE	A nine-item scale covered entrepreneurial confidence for tasks such as developing entrepreneurial ideas, resource utilisation, and identifying opportunities.	McGee <i>et al.</i> , 2009; Akhtar <i>et al.</i> , 2022
TQ	A four-item scale covered course material, tests, and instructor competence.	Brown & Hanlon, 2016; Gedeon, 2017
LM	A three-item scale covered the relevance of study cases and instructor feedback.	Gaspar Pacheco <i>et al.</i> , 2024
EE	A three-item scale covered internships, network development, and entrepreneurial competitions.	Viswanath <i>et al.</i> , 2024
US	A six-item scale measured entrepreneurial support services related to entrepreneurial competitions, personal guidance, and networking sessions.	Ruskovaara <i>et al.</i> , 2015

Source: own study.

Data Analysis

After cleaning and coding the data in Microsoft Excel, we analysed both the measurement and structural models using SmartPLS version 4.1.0.9. We employed partial least squares structural equation modelling (PLS-SEM) due to its suitability for complex model estimation and its robustness to violations of data normality assumptions (Sarstedt *et al.*, 2022). Moreover, we mitigated potential common method bias (CMB) through procedural and statistical control measures recommended by Podsakoff *et al.* (2003). Following a partial correlation remedy for statistics, we reduced the variance to 40.54%; hence, CMB was not a problem. As shown in Table 2, variable correlations remained significant even in a post-common method variance (CMV) adjustment, with adjusted correlations below and zero-order correlations above the diagonal, confirming strong relationships between the variables.

Table 2. Correlations adjusted for CMV

Variables	1	2	3	4
1. TQ	—	0.878***	0.818***	0.724***
2. LM	0.802***	—	0.878***	0.731***
3. EE	0.705***	0.802***	—	0.694***
4. ESE	0.537***	0.549***	0.490***	—

Note: Sample comprises 1 246 respondents. Lower diagonal values represent correlations adjusted for common method variance; upper diagonal values indicate unadjusted bivariate correlations. Significance thresholds: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Source: own study.

Ethical Consideration

We obtained ethical clearance for this study from the Research Ethics Board of Anglia Ruskin University (Reference: ETH2324-9913). Each participant provided informed consent following clear communication of their rights, including voluntary involvement and unrestricted withdrawal. We protected participant anonymity through response coding and present all findings in aggregate form to preserve confidentiality.

RESULTS AND DISCUSSION

Measurement Model Assessment

We validated the measurement model through a systematic assessment protocol. We ascertained construct reliability using Cronbach's alpha (CA) alongside composite reliability (CR) coefficients.

We demonstrated convergent validity through average variance extracted (AVE) calculations and verified discriminant validity by applying the Fornell-Larcker criterion (Hair *et al.*, 2019). Each construct exhibited robust reliability metrics: CA (0.893-0.967) and CR (0.894-0.967) exceeding the recommended thresholds of 0.7 and 0.6, respectively. Factor loadings ranged from 0.854 to 0.925, exceeding the 0.7 benchmark, while AVE values (0.761-0.829) surpassed the 0.5 threshold, confirming convergent validity (Hair *et al.*, 2019) (Table 3).

Table 3. Factor loadings, CA, CR and AVE for variables

Constructs	Factor loadings	CA	CR	AVE
EE	0.895-0.923	0.897	0.899	0.829
ESE	0.859-0.906	0.967	0.967	0.789
LM	0.897-0.914	0.893	0.894	0.824
TQ	0.882-0.925	0.927	0.927	0.820
US	0.854-0.899	0.937	0.938	0.761

Source: own study.

Discriminant Validity

As outlined above, we evaluated discriminant validity using the Fornell-Larcker criterion (Table 4). Results showed that the square root of the AVE for each construct was greater than its correlations with all other constructs, indicating satisfactory discriminant validity.

Table 4. Discriminant validity

Fornell-Larcker criterion	ESE	EE	LM	TQ	US
ESE	0.888	–	–	–	–
EE	0.694	0.910	–	–	–
LM	0.723	0.868	0.908	–	–
TQ	0.723	0.819	0.872	0.906	–
US	0.754	0.648	0.657	0.646	0.872

Source: own study.

Structural Model Results

Guided by Hair *et al.*'s (2017) protocol, we evaluated the structural model via R^2 (explanatory power), Q^2 (predictive accuracy), f^2 (effect magnitude), and path coefficient analysis. The analysis employed bootstrapping resampling (5 000 subsamples) with default parallel processing options to assess path coefficients' significance. This approach tested the effect of TQ, LM, and EE on ESE, both directly and indirectly via US as a mediator. This process provided in-depth information on entrepreneurial capability development in a university context.

Predictive Accuracy and Predictive Relevance

We determined the model's explained variance and predictive relevance through R^2 and Q^2 metrics (Table 5). R^2 values indicated high predictive accuracy for ESE (0.675) and moderate accuracy for US (0.469). Q^2 values exceeding zero for both ESE (0.563) and US (0.465) confirmed strong predictive relevance. RMSE and MAE values were within acceptable ranges, validating model accuracy.

Table 5. Predictive accuracy and predictive relevance

Variable	R^2	R^2 adj.	Q^2 predict	RMSE	MAE
ESE	0.675	0.674	0.563	0.662	0.465
US	0.469	0.468	0.465	0.733	0.539

Source: own study.

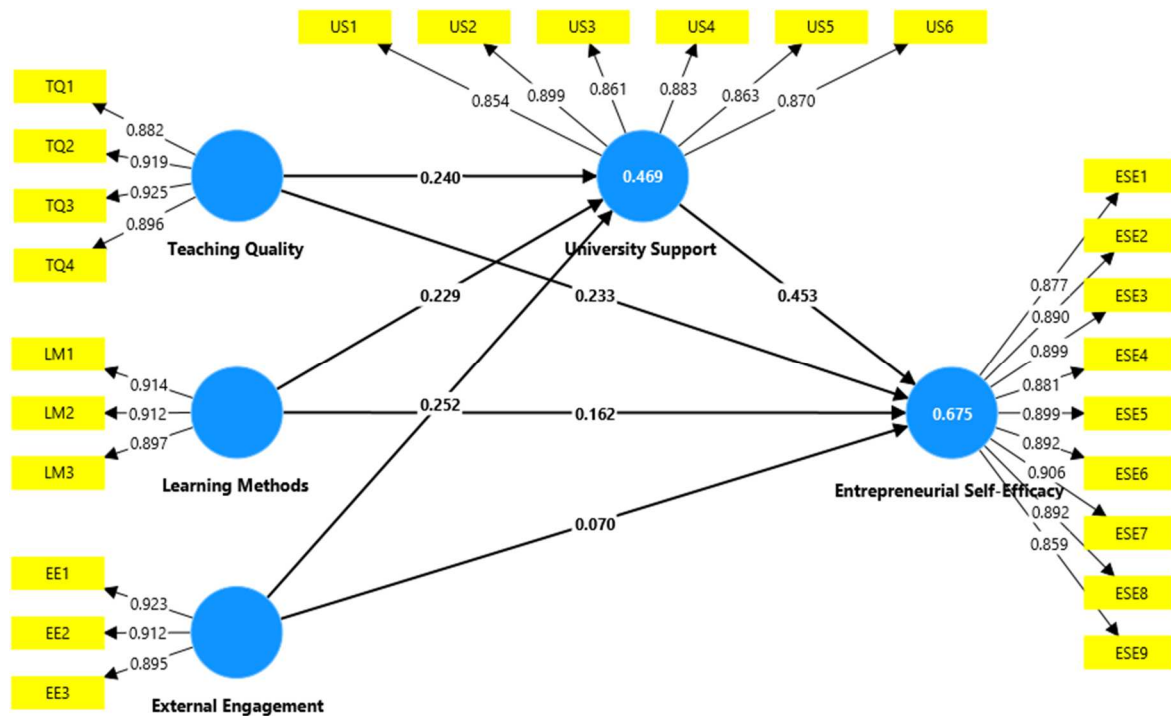


Figure 2. Indicator loadings

Source: own elaboration.

The Effect Size

We performed an f^2 analysis to determine the relative influence of the model's predictors on ESE. Following the guidelines of Benitez *et al.* (2020), we considered f^2 values of 0.02-0.149 as small, 0.150-0.349 as medium, and ≥ 0.350 as large effects. The results indicate varying degrees of practical significance, with university support showing the strongest impact ($f^2=0.335$), reflecting a medium-to-large effect on ESE. Meanwhile, both TQ ($f^2=0.036$) and LM ($f^2=0.013$) exhibited minimal effects (Figure 2). On the other hand, while EE displayed a negligible effect size ($f^2=0.003$), US, as a dependent variable, demonstrated small effect sizes for all three predictors (Table 6).

Hypotheses Testing

The path analysis results from our structural equation modelling revealed significant support for six of the seven hypothesised relationships. The analysis provided empirical support for H₁ and H₂, with TQ ($\beta=0.233$, $p<0.001$) and LM ($\beta=0.162$, $p<0.001$) both significantly enhancing ESE. Notably, H₃ was not substantiated, as EE's direct influence on ESE lacked statistical significance ($\beta=0.070$, $t=1.824$, $p=0.068$). Remarkably, US manifested the strongest direct effect on ESE ($\beta=0.453$, $t=12.772$, $p<0.001$), providing robust validation for H₄. The findings also confirmed that TQ ($\beta=0.240$, $t=4.652$, $p<0.001$), LM ($\beta=0.229$, $t=4.027$, $p<0.001$), and EE ($\beta=0.252$, $t=5.372$, $p<0.001$) each significantly predict US, thereby corroborating H₅, H₆, and H₇ (Table 6).

Table 6. Hypotheses results

Hypotheses	Estimate	f^2	STD.DEV	T-statistics	P-values	Decision
TQ -> ESE (H1)	0.233	0.036	0.046	5.048	0.000	Supported
LM -> ESE (H2)	0.162	0.013	0.043	3.782	0.000	Supported
EE -> ESE (H3)	0.070	0.003	0.038	1.824	0.068	Unsupported
US -> ESE (H4)	0.453	0.335	0.035	12.772	0.000	Supported
TQ -> US (H5)	0.240	0.024	0.051	4.652	0.000	Supported
LM -> US (H6)	0.229	0.017	0.057	4.027	0.000	Supported
EE -> US (H7)	0.252	0.028	0.047	5.372	0.000	Supported

Source: own study.

Mediation Analysis

As discussed earlier, we used a bootstrapping of 5 000 resamples on our dataset of 1 246 respondents to examine the mediating effects. The mediation analysis revealed significant indirect effects for all three hypothesised mediating relationships. The analysis showed that the US significantly mediates the relationship between TQ and ESE ($\beta = 0.108$, $STDEV = 0.025$, $p < 0.001$), with bias-corrected confidence intervals (CI – 0.063, 0.161) not containing zero. Similarly, significant mediating effects were found for the US in the relationship between LM and ESE ($\beta = 0.104$, $STDEV = 0.027$, $p < 0.001$, and CI – 0.053, 0.159), as well as between EE and ESE ($\beta = 0.114$, $STDEV = 0.023$, $p < 0.001$, and CI – 0.074, 0.163). These results provided strong support for hypotheses H8a, H8b, and H8c, confirming the mediating role of university support in our conceptual framework (Table 7).

Table 7. Results of mediation analysis

Hypotheses	Estimate	STDEV	Bias-corrected 97.5% CI			Percentile 97.5% CI		
			Lower	Upper	p-value	p-value	p-value	p-value
TQ -> US -> ESE (H8a)	0.108	0.025	0.063	0.161	0.000	0.061	0.160	0.000
LM -> US -> ESE (H8b)	0.104	0.027	0.053	0.159	0.000	0.053	0.158	0.000
EE-> US -> ESE (H8c)	0.114	0.023	0.074	0.163	0.000	0.072	0.161	0.000

Source: own study.

Performance Analysis

The analysis of performance scores presents the comparative importance and effectiveness of disparate factors influencing ESE among university students (Table 8). US had the greatest impact of 0.453, and a performance rating of 62.155, suggesting its significant role in developing university students' ESE. Teaching quality emerged with the second-largest impact, with an overall effect of 0.341 and a performance rating of 60.330. LM had a moderate impact (overall effect 0.266) but a high performance of 62.875. External engagement ranked fourth with an impact of 0.184 and a high performance of 62.751. Overall, the outcome revealed the hierarchical value of institution-backed frameworks and instruction methodologies in developing ESE among university students. This suggests that university-backed frameworks particularly drive students' ESE.

Table 8. Important performance analysis

Variable	Total effects	Performance	Rankings
US	0.453	62.155	1
TQ	0.341	60.330	2
LM	0.266	62.875	3
EE	0.184	62.751	4

Source: own study.

Discussion

Our findings support H1 and H5, confirming significant positive relationships between TQ and both ESE and US. These results corroborate Luo *et al.* (2022), demonstrating that quality EntEdu directly influences ESE development. Beyond confirming prior empirical evidence, the findings align with institutional theory, which posits that organisational practices, such as teaching quality, serve as regulative and normative mechanisms that shape individual behaviour within institutions. Regarding LM, our findings revealed significant positive relationships with both ESE (H2) and US (H6). These results correspond with studies by Abd Rahim *et al.* (2022) and Anwar and Abdullah (2021). While prior studies largely emphasise the pedagogical superiority of experiential learning, our findings extend this literature by showing that the effectiveness of such methods is institutionally contingent. The results of the indirect effect examination further indicate that US transmits a significant portion of LM's influence to ESE, suggesting that institutional support enhances the effectiveness of diverse learning approaches.

A key insight of this study is that EE exerts no significant direct impact on ESE (H3); instead, its influence operates strongly through US as a mediating factor (H8c). This finding contrasts with studies such as Andayani *et al.* (2020), which report direct positive effects of EE on ESE. An institutional lens may explain the divergence. In contexts where universities possess strong formalised support structures, students may immediately internalise external engagement activities, producing direct efficacy gains. However, in emerging economies like Ghana, EE often remains loosely coupled with institutional systems, limiting its standalone impact on self-efficacy.

From the perspective of institutional theory, EE represents an exogenous institutional influence that requires internal organisational alignment to become effective. Without structured mentoring, reflection mechanisms, and institutional follow-up, EE may lack the cognitive reinforcement necessary to shape self-efficacy. Thus, our findings suggest that EE contributes to ESE only when universities provide the institutional scaffolding required to legitimise, interpret, and integrate these experiences into students' entrepreneurial identity formation.

Moreover, the direct influence of US on ESE (H4) is strongly positive, which aligns with the findings of Lu *et al.* (2021) from a large-scale study of 13 954 graduates. The strength of the relationship implies that institutional support mechanisms significantly contribute to the development of students' entrepreneurial capabilities, thus supporting Yesmin *et al.*'s (2024) assertion that a well-structured support environment is critical for ESE development.

The study indicated significant relationships between TQ and US (H5), corroborating Farooqi *et al.* (2023), who found among 686 students that TQ influences institutional resource allocation. Likewise, our findings demonstrate that LM affects US (H6), corroborating the findings of Descals-Tomás *et al.* (2021) that LM strengthens institutional support mechanisms. The substantial effect of EE on US (H7) further supports the findings of Atta-Owusu and Fitjar (2023; 2022). These studies show that external partnerships positively impact supportive institutional frameworks. This relationship highlights the importance of maintaining meaningful connections between industry and academia to enhance support frameworks.

A further key finding of this study is the strong mediating role of US, showing significant positive relationships with ESE (H4) and mediating all three independent variables (H8a, b, c). Vivekananth *et al.* (2023) support the strong mediation, emphasising the importance of institutional support structures in the enhancement of entrepreneurship. This implies that US systems are prerequisites for converting educational inputs into entrepreneurial capacities. Our performance analysis shows a clear influence hierarchy, with US being the strongest contributor to ESE development, followed by TQ, LM, and EE. The high-performance scores across the board suggest that a holistic approach towards EntEdu, integrating all these elements through strong institutional support systems, is the most effective way of nurturing students' ESE.

CONCLUSIONS

Drawing on data from 1 246 students across 11 Ghanaian universities, this study demonstrates that TQ and LM directly enhance ESE, while EE influences ESE through US mediation. The hierarchy of influences (US > TQ > LM > EE) reveals US systems' critical catalytic role in transforming educational inputs into entrepreneurial competence. Universities should strengthen support structures through entrepreneurship centres, mentorship programmes, faculty development, and experiential learning. Policymakers should prioritise US systems and academic-industry partnerships to help Ghana transition from a job-seeking to a job-creating economy.

The Study's Implications and Recommendations

This research extends the self-efficacy theory by empirically validating US systems' mediating role in ESE development. While previous studies examined direct TQ-ESE and LM-ESE relationships, our findings reveal institutional support mechanisms as critical intermediaries, and theorises the complex pathways through which entrepreneurial competence develops in emerging economies.

Given US systems' strongest effect on ESE, universities should prioritise a comprehensive support infrastructure including entrepreneurship hubs, business incubators, innovation labs, and seed

funding schemes. Since EE influences ESE only through US mediation, institutions must deliberately integrate internship programmes, industry partnerships, and networking events within formalised support structures to maximise entrepreneurial development.

The significant TQ-ESE and LM-ESE relationships indicate that universities should invest in faculty development programmes emphasising experiential learning methods, case study development, and real-world problem integration. Curriculum designers should incorporate business simulations, student-run enterprises, and industry-based projects, supported by mentorship programmes linking students with experienced entrepreneurs.

For policymaking, to address youth unemployment, we recommend the establishment of structured entrepreneurship support offices to provide seed funding, technical assistance, market linkages, and monitoring systems. Universities should form strategic collaborations with industry associations and government agencies to create internship and mentoring pathways that transform theoretical knowledge into market-ready entrepreneurial capabilities.

The Study's Limitations and Future Research Agenda

This study has some limitations that influence the results' interpretation. Firstly, the sampling encompassing only students with EntEdu exposure potentially inflated ESE scores and strengthened observed relationships, limiting generalisability. Secondly, the cross-sectional design prevented causal inference; we could not determine whether university interventions caused ESE development or whether students with higher pre-existing ESE engaged more with programmes. Thirdly, the Ghana-only context may have limited transferability, particularly the strong US mediating role and non-significant EE→ESE direct effect, which may reflect Ghana's specific institutional environment. Future research should: (a) compare ESE between students with and without formal entrepreneurship training, (b) conduct longitudinal studies tracking graduates' entrepreneurial activities to establish causality and long-term effectiveness, and (c) perform cross-country comparisons within SSA to examine how institutional and cultural contexts influence these relationships.

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Use of Artificial Intelligence

The manuscript is free of AI/GAI usage.

Conflict of Interest

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