E-ISSN: 1115 - 8530 P-ISSN: 3026-8958
MPRI-JFRBD | INTERNATIONAL JOURNAL OF FINANCIAL RES. AND BUSINESS DEVELOPMENT
VOL. 13 NO. 7 – JULY, 2026

FROM ENTREPRENEURIAL CULTURE TO ENTREPRENEURIAL INTENTION: THE SEQUENTIAL MEDIATING ROLES OF RESEARCH COMPETENCE AND ENTREPRENEURIAL MINDSET AMONG UNIVERSITY STUDENTS IN GHANA

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DOI: https://doi.org/10.70382/mejfrbd.v13i7.136

Abstract

This study aimed to determine the influence of entrepreneurial culture and research competence on the entrepreneurial mindset and intention of university students in Ghana. The study was guided by entrepreneurship education and social cognitive theories. The study hypothesized that entrepreneurial culture directly influenced entrepreneurial mindset and intention while research competence directly predicted entrepreneurial mindset and partially mediated the relationship between entrepreneurial culture and entrepreneurial intention. A cross-sectional survey design was adopted and 251 respondents selected from five universities in Ghana through proportional random sampling participated in the study. Data analysis was performed using partial least squares structural equation modeling. The results revealed that entrepreneurial culture directly and positively predicted research competence, entrepreneurial mindset, and entrepreneurial intention. Research competence directly and positively

Keywords: Entrepreneurial Culture; Research Competence; Entrepreneurial Mindset; Entrepreneurial Intention; Higher Education; Partial Least Squares Structural Equation Modelling (PLS-SEM).

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predicted entrepreneurial mindset and intention. The study concludes that there is a need to promote entrepreneurial learning environments and research competence amongst Ghanaian university students to improve entrepreneurial outcomes. The study contributes to the body of knowledge on entrepreneurship education and provides implications for policy and practice in Ghana and other third-world countries with similar challenges.

Introduction

Entrepreneurship is a key force in economic development, job creation, and innovation in advanced and emerging economies. In many developing countries, it is regarded as a critical response to persistent graduate unemployment, youth unemployment, poverty, inequality, and sluggish industrialization. Studies have shown that entrepreneurial initiatives have a significant impact on job creation, social and economic development, and community well-being (Linan & Fayolle, 2015; Naminse et al., 2018). As a result, there has been a growing emphasis on entrepreneurship education and skills training for young people in order to achieve competitive and inclusive national development (Klofsten et al., 2019). In Ghana, entrepreneurship has become a critical priority in national development agendas due to the rising graduate unemployment rates and the inability of the formal sector to absorb the swelling numbers of university graduates. Various programs such as the National Entrepreneurship and Innovation Programme (NEIP), the Ghana Enterprises Agency, university entrepreneurship development centers, incubators, and entrepreneurship-focused curricula are being leveraged to encourage entrepreneurial self-employment and new business creation among graduates. These interventions are predicated on the fact that entrepreneurship education fosters entrepreneurial potential, competencies, and skills that enable graduates to recognize and capitalize on emerging opportunities (Ratten & Jones, 2020). Despite these efforts, the level of young people's entrepreneurial engagement in Ghana remains low, which raises questions about the effectiveness of entrepreneurship education in fostering entrepreneurial intentions among graduates.

Studies have shown that entrepreneurship education has a positive influence on entrepreneurial intentions by raising awareness, knowledge, and confidence in starting a business (Anwar & Saleem, 2019; Boldureanu et al., 2020). It also provides students with entrepreneurial know-how, managerial competencies, and an innovative attitude necessary for venturing into businesses (Hahn et al., 2017). However, the influence of entrepreneurship education on students' entrepreneurial intentions is debated, with some studies arguing that it has little effect when compared to other factors such as cognitive, behavioral, and environmental influences (Linan & Fayolle, 2015; Nabi et al.,

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2017). It is therefore important to conceptualize entrepreneurship education in the broader perspective of individual capabilities and institutional entrepreneurship-promoting environments. One such individual capability is entrepreneurial mindset, which refers to a "general ability to recognize and act upon opportunities, to think creatively, to deal with complex, ill-structured, and conflicting situations, and to make decisions in the face of uncertainty" (Mathisen & Arnulf, 2013, p. 135). Students with an entrepreneurial mindset are more likely to be able to apply theoretical concepts to practice (Pfeifer et al., 2016; Solesvik et al., 2013). They also tend to have a proactive approach to opportunity recognition and exploitation, be innovative and adaptable in the face of adversity, and display high levels of resilience in the face of rejections and failures, which are critical factors in entrepreneurial success in an unpredictable business environment.

Although studies have shown that entrepreneurial mindset plays a critical role in students' entrepreneurial intentions, the mechanisms by which it is cultivated remain understudied. The growing body of literature on entrepreneurial mindset highlights the role of entrepreneurship education in its development. However, researchers have begun to realize that entrepreneurial mindset is influenced by a confluence of factors, including entrepreneurship education, as well as students' learning orientation, creativity, and research competence, which are critical skills emphasized by many universities in their entrepreneurship education programs. Ghafar (2020). For instance, research competence enables students to identify and understand social and economic problems, critically evaluate existing theories and practices, develop innovative solutions, and make rational decisions based on their findings. In other words, it empowers students to engage in evidence-based entrepreneurial decision-making. Similarly, a learning orientation facilitates students' continuous learning and skill-building processes, enabling them to become lifelong learners and acquire the skills necessary for entrepreneurial success. Ali (2025). Creativity, on the other hand, enables students to think outside the box and come up with novel solutions to problems, as well as identify and exploit emerging opportunities. Adams (2025) It is therefore plausible to argue that learning orientation, creativity, and research competence could partially mediate the relationship between entrepreneurship education and entrepreneurial mindset, and by extension, entrepreneurial intentions. Although the influence of institutional entrepreneurial environments on students' entrepreneurial intentions has been documented, the moderating role of learning orientation, creativity, and research competence on the relationship between entrepreneurial mindset and entrepreneurial intentions has received scant research attention. Most studies have focused on the direct effect of entrepreneurship education on students' entrepreneurial intentions, with few examining the intervening role of entrepreneurial mindset. As a result, there is a need to fill this research gap by investigating the indirect role of entrepreneurial mindset in the

relationship between learning orientation, creativity, research competence, and entrepreneurial intentions.

This study contributes to the entrepreneurship education and national development literature in two major ways. First, it goes beyond the traditional view of entrepreneurship education by proposing a conceptual model that integrates learning orientation, creativity, research competence, and entrepreneurial mindset as key predictors of students' entrepreneurial intentions. Unlike previous studies that have focused on the role of entrepreneurship education in fostering entrepreneurial intentions, this study highlights the role of individual factors such as learning orientation, creativity, and research competence in the development of entrepreneurial mindset and intentions. Second, this study contributes to the entrepreneurship education literature by providing empirical insights into the role of learning orientation, creativity, research competence, entrepreneurial mindset, and entrepreneurial intentions in promoting entrepreneurial self-employment and graduate unemployment in Ghana. By situating the discussion within the Ghanaian context, this study provides a nuanced understanding of the mechanisms by which universities can foster entrepreneurial intentions among students in emerging economies. This will have implications for policy and practice in entrepreneurship education in Ghana and other developing countries. The conceptual model proposed in this study is based on Social Cognitive Theory (Bandura, 2001), Human Capital Theory (Becker, 1964), and Entrepreneurial Cognition Theory (Mitchell et al., 2002). According to Social Cognitive Theory, individuals develop entrepreneurial intentions through observational learning. In other words, students' entrepreneurial intentions are likely to be influenced by their observations of role models such as entrepreneurial lecturers, family members, and friends who engage in entrepreneurial activities. Human Capital Theory posits that individuals are likely to invest in human capital, such as academic qualifications and skills, to increase their productivity and, by extension, their income. In the context of entrepreneurship education, this theory suggests that students are likely to develop entrepreneurial intentions if they perceive entrepreneurship education as an investment that will yield high returns in terms of income and job satisfaction. Finally, Entrepreneurial Cognition Theory argues that entrepreneurial intentions are influenced by individuals' entrepreneurial cognitions, which are developed through experiential learning. These theories provide the theoretical framework for this study.

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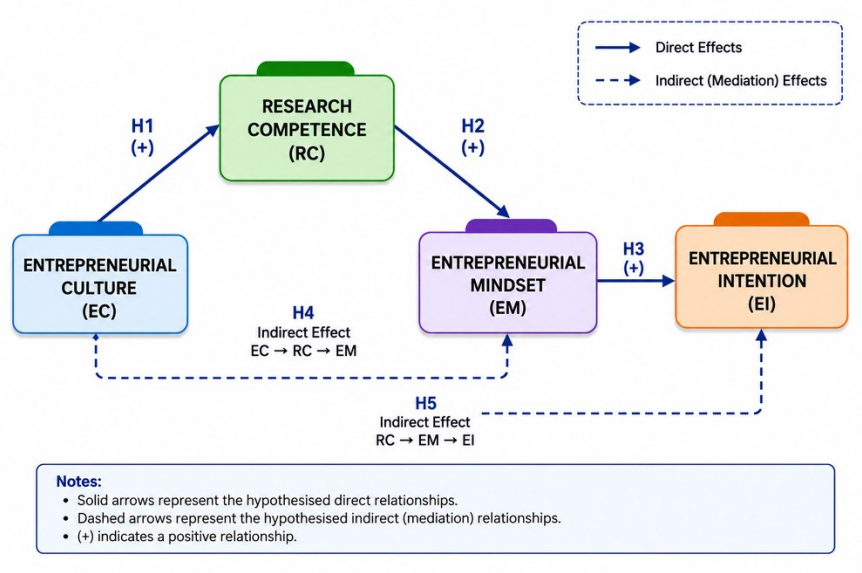

Fig 1: Conceptual Framework
Source: Author, (2026)

Figure 1 presents the conceptual model guiding this study. Developed from Social Cognitive Theory (Bandura, 2001), Human Capital Theory (Becker, 1964), and Entrepreneurial Cognition Theory (Mitchell et al., 2002), along with empirical findings on entrepreneurship education and behavior, the model suggests that entrepreneurial culture fosters an institutional environment that supports learning orientation, creativity, and collaborative decision-making. These factors collectively enhance students' research competence a multidimensional construct encompassing problem identification, literature engagement, methodological skills, data analysis, communication, and academic integrity. Improved research competence, in turn, promotes entrepreneurial mindset, which ultimately strengthens entrepreneurial intention among university students.

Literature Review

Entrepreneurial Culture

Entrepreneurial culture has gained growing attention in studies on entrepreneurship and higher education, as it shapes the social and institutional context in which entrepreneurial knowledge, attitudes, and behaviors are formed. It encompasses shared values, norms, beliefs, practices, and behavioral patterns within an academic or community setting that support creativity, innovation, risk-taking, collaboration, and proactive problem-solving. Al-Lawati (2022). In universities, this culture goes beyond formal teaching by fostering an ecosystem that promotes experimentation, interdisciplinary cooperation, and student engagement in entrepreneurial initiatives. Institutions contribute significantly by offering

access to business incubators, innovation challenges, mentorship programs, collaborative learning opportunities, and industry partnerships. These elements help build students' confidence, creativity, and motivation to consider entrepreneurship as a viable career path instead of relying only on traditional employment (Arranz et al., 2019; Bogatyreva et al., 2019). In developing countries like Ghana, where graduate unemployment remains high and self-employment is increasingly vital, universities are becoming key drivers in building entrepreneurial ecosystems that prepare students for opportunity-based ventures.

Empirical research consistently shows a positive link between entrepreneurial culture and entrepreneurial intention. Students who view their university environment as supportive of innovation and enterprise tend to express stronger intentions to start new businesses (Chukwuma-Nwuba, 2018; Fragoso et al., 2020; Sesen & Pruett, 2014). Exposure to entrepreneurial role models, participation in innovation projects, teamwork on ventures, and hands-on experiences all reinforce entrepreneurial aspirations. As such, entrepreneurial culture acts as a critical institutional resource that supports entrepreneurial behavior independently of formal coursework. Beyond its direct impact on intention, it also plays a central role in shaping entrepreneurial mindset an individual's cognitive tendency to identify opportunities, solve problems creatively, adapt to uncertainty, and make innovative decisions in dynamic environments (Mathisen & Arnulf, 2013). According to Social Cognitive Theory (Bandura, 2001), people's actions are shaped through ongoing interactions between personal factors, behavior, and the environment. Within this framework, entrepreneurial culture functions as an environmental influence that fosters cognitive development by encouraging opportunity recognition, resilience, experimentation, and continuous learning.

The theory further suggests that entrepreneurial mindset emerges from the interplay of environmental conditions, personal cognitive abilities, and practical experiences (Bandura, 2001). Universities that embed entrepreneurship into curricula, experiential learning, mentoring, joint research, and extracurricular activities create conditions conducive to developing entrepreneurial thinking. Thus, entrepreneurial culture not only boosts students' interest in starting businesses but also cultivates advanced cognitive skills that enable them to think and act entrepreneurially (Cui, 2021). Evidence supports this view, showing that mindset development is strengthened through sustained exposure to supportive institutional environments and real-world entrepreneurial experiences (Maphalala, 2025; Shepherd et al., 2010). Students immersed in such cultures are more likely to develop skills in identifying opportunities, thinking innovatively, demonstrating resilience, and confidently tackling complex business issues, attributes that improve decision-making and increase the likelihood of taking entrepreneurial action.

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While much of the existing research focuses on the direct effect of entrepreneurial culture on entrepreneurial intention, less attention has been paid to how it contributes to broader educational outcomes such as creativity, learning orientation, and research competence capabilities that indirectly shape entrepreneurial mindset. Today's universities are expected to produce graduates who can generate novel solutions, apply evidence-based reasoning, adapt to change, and convert research into entrepreneurial ventures. This shift implies that entrepreneurial culture may influence intention not just through dedicated entrepreneurship courses, but also by nurturing underlying cognitive and research skills. This study therefore expands current literature by positioning entrepreneurial culture as a foundational institutional asset that promotes learning orientation, creativity, research competence, and entrepreneurial mindset among university students in Ghana. This broader perspective aligns with the evolving role of higher education institutions as integrated entrepreneurial ecosystems that combine teaching, research, innovation, and enterprise development to meet the demands of complex modern economies.

Moreover, entrepreneurial culture helps create an academic environment that supports lifelong learning, creative exploration, and the growth of research capabilities. Universities serve as platforms where innovation, opportunity-focused thinking, and entrepreneurial values are embedded across teaching, research, and experiential learning. Rather than being limited to specific entrepreneurship modules, these cultural elements permeate the wider institution by promoting curiosity, teamwork, creativity, and data-driven problem solving (Nowiński et al., 2019). As a result, institutions with strong entrepreneurial cultures equip students with competencies that go beyond launching startups and support enduring entrepreneurial capabilities. Globally, universities have increasingly adopted entrepreneurship into strategic planning through innovation centers, cross-disciplinary collaboration, experiential education, business incubation, and research-led entrepreneurial initiatives (Blenker et al., 2012). These changes reflect a growing understanding that entrepreneurial ability is cultivated through supportive learning contexts, not just formal instruction. Consequently, policymakers and academic leaders are placing greater emphasis on strengthening university ecosystems by advancing innovation, creativity, collaborative learning, and knowledge exchange (Ranga, 2013). Such environments foster active learners who continuously seek knowledge, challenge assumptions, generate original ideas, and apply research to real-world problems.

Additionally, entrepreneurial culture strengthens learning orientation by encouraging openness to new knowledge, self-improvement, and adaptive learning strategies. Students in entrepreneurial universities are more likely to engage in collaborative inquiry, independent research, and reflective thinking—all of which enhance creativity and

research proficiency. Similarly, institutional environments that prioritize innovation motivate students to test new concepts, question established norms, and devise creative responses to societal and economic challenges. These experiences improve their ability to spot opportunities and turn knowledge into action.

From the standpoint of Social Cognitive Theory (Bandura, 2001), entrepreneurial culture serves as an environmental force that shapes cognitive development through reciprocal interactions between institutional settings and individual capacities. Students exposed to supportive entrepreneurial environments gradually build stronger entrepreneurial mindsets, gaining confidence, opportunity identification skills, creative reasoning, and evidence-based problem-solving abilities. Recent studies echo this, suggesting that entrepreneurial universities enhance entrepreneurial capabilities by integrating innovation, research, collaboration, and experiential learning into education, thereby improving students' entrepreneurial cognition and behavioral intentions (Cui et al., 2019; Shepherd et al., 2010). Therefore, this study posits that entrepreneurial culture functions as a core institutional resource that stimulates learning orientation, creativity, research competence, entrepreneurial mindset, and ultimately, entrepreneurial intention. Unlike earlier studies that focused narrowly on entrepreneurship education, this research views entrepreneurial culture as a holistic ecosystem that develops the broader cognitive and research skills essential for success in today's knowledge-driven economies.

Learning Orientation

Learning orientation has become a key concept in entrepreneurship and higher education research, reflecting an individual's commitment to acquiring new knowledge, improving skills, and adapting to changing circumstances. It refers to a lasting inclination both at individual and organizational levels—to value learning, critical reflection, knowledge acquisition, and continuous improvement as pathways to long-term success (Sinkula et al., 1997; Calantone et al., 2002). In university settings, learning orientation encourages students to actively participate in knowledge creation rather than passively absorb information, thus supporting the cognitive development needed for entrepreneurial thinking and innovation. Within higher education, it extends beyond classroom instruction by promoting inquiry-based learning, teamwork, problem-solving, reflection, and cross-disciplinary involvement. Institutions increasingly recognize that graduates must possess lifelong learning skills to navigate technological shifts, market volatility, and evolving societal needs. As such, learning-oriented environments encourage students to pursue new knowledge, question existing ideas, experiment with innovations, and continually refine their academic and professional abilities (Aithal, 2023; Calantone et al., 2002; Sinkula et al., 1997).

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Recent studies identify learning orientation as a key driver of entrepreneurial capability, as individuals with strong learning orientations are more inclined to explore opportunities, acquire relevant knowledge, and develop innovative solutions to emerging problems (Lumpkin & Lichtenstein, 2005). These individuals typically show greater adaptability, resilience, and openness—qualities closely associated with successful entrepreneurs. In entrepreneurial universities, learning orientation enhances students' ability to connect theoretical knowledge with practical application, thereby improving their entrepreneurial skills and opportunity recognition (Ratten & Jones, 2020). From the perspective of Social Cognitive Theory (Bandura, 2001), learning orientation functions as a cognitive mechanism through which environmental experiences shape behavioral development. Students learn not only from formal lessons but also through observation, collaboration, experimentation, and interaction with their academic surroundings. Institutions that promote continuous learning, independent inquiry, collaborative problem-solving, and experiential education provide fertile ground for developing cognitive skills, creativity, and entrepreneurial thinking. Likewise, Human Capital Theory (Becker, 1964) suggests that investments in knowledge and skills enhance individuals' productivity and their ability to identify and exploit entrepreneurial opportunities.

Learning orientation also plays a vital role in cultivating creativity and research competence. Students who actively pursue knowledge are more likely to challenge conventional approaches, generate original ideas, and engage in systematic investigation to address complex issues. Through sustained learning, they strengthen analytical reasoning, evidence-based decision-making, and creative problem-solving—skills that contribute directly to the development of an entrepreneurial mindset. Prior research indicates that individuals with strong learning orientations demonstrate higher levels of innovation, knowledge integration, and opportunity recognition compared to those with weaker orientations (Calantone et al., 2002; Lumpkin & Lichtenstein, 2005). Despite its prominence in management and organizational learning literature, relatively few entrepreneurship studies have explored its influence on entrepreneurial mindset and intention among university students in developing nations. Much of the existing work has centered on entrepreneurship education, neglecting the broader learning processes through which entrepreneurial competencies are built. Addressing this gap, the present study argues that learning orientation is a fundamental cognitive capacity that fosters creativity, enhances research competence, and ultimately strengthens entrepreneurial mindset and intention among tertiary students in Ghana.

Research Competence

Research competence is the combination of knowledge, skills, and competencies that enable one to formulate research questions, seek and evaluate information, choose

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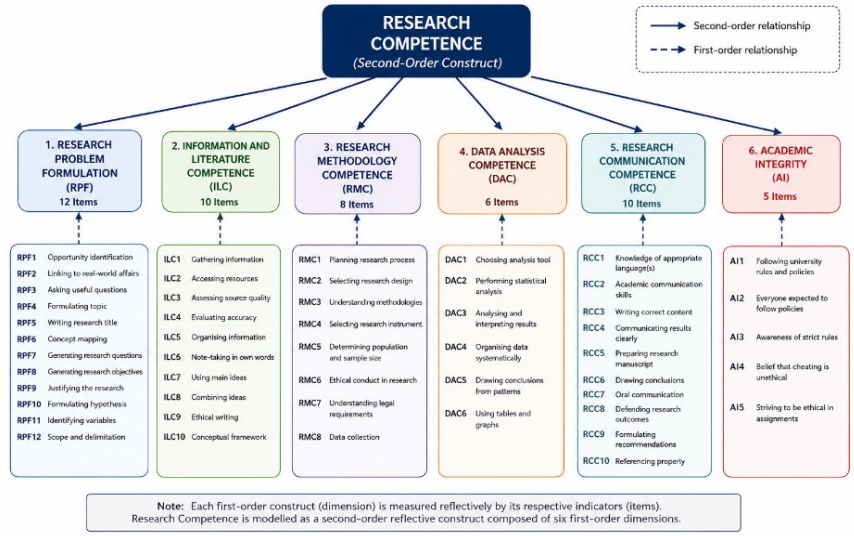
appropriate methodologies, interpret results, report findings, and adhere to professional research ethics. It is regarded as a generic graduate competency that promotes critical thinking, informed decision-making, creativity, and effective problem-solving in professional contexts (Marvel et al., 2016). In entrepreneurship education, research competence encourages students to identify market opportunities, review and analyze business information, recognize consumer needs, and develop innovative solutions to meet market needs. Besides the traditional research aspects, it promotes entrepreneurial skills such as creativity, innovation, and commercialization of ideas (Baggen et al., 2022). The study will adopt the view that research competence is comprised of defining research problems, managing information and literature, applying research methods, analyzing information, reporting findings, and upholding research ethics to promote academic innovation and entrepreneurial competence. Research competence was identified as a higher-order reflective construct consisting of six lower-order dimensions; Formulating Research Problems, Information and Literature Skills, Research Methodology Proficiency, Data Analysis Ability, Communicating Research, and Academic Integrity. Each component was measured using reflective indicators extracted from extant measures and adapted to the Ghanaian higher education context. The measurement model specified for the research competence construct is depicted in Figure 2 below.

Figure 2. Hierarchical Measurement Model of Research Competence



Source: *Authors' conceptualization based on Bandura (2001), Becker (1964), Mitchell et al. (2002), and the measurement dimensions adopted in this study.*

As shown in Figure 2, research competence was tested as a second-order multi-dimensional construct reflected in six competency areas. Overall, research competence includes students' ability to define research problems, retrieve and analyze scholarly

information, design research approaches, interpret research data, communicate research outcomes, and adhere to research ethics. All indicators together contribute to assessing students' research competence and understanding the link between research competence and entrepreneurial mindsets, as well as the mediating role of research competence in the relationship between entrepreneurial mindsets, entrepreneurial intentions, and engagement in research activities.

Entrepreneurial Mindset

Entrepreneurial mindset is a cognitive framework that entails opportunity recognition, innovation, initiative, enterprise, risk-taking, and adaptability in the face of adversity. It is a "thinking pattern" that enables individuals to perceive and respond to opportunities by creating value through innovative ideas (Haynie et al., 2010). Although it may be innate in some people, entrepreneurial mindset can also be cultivated through targeted pedagogy and entrepreneurial conducive environments (Bandura, 2001). Individuals with a strong entrepreneurial mindset are likely to exhibit enhanced self-confidence, creativity, strategic thinking, and persistence when navigating dynamic and uncertain business environments (Mitchell et al., 2002). In entrepreneurial education, it serves as a critical link between taught skills and their effective application in practice (Mukhtar et al., 2021). This study will adopt the view that entrepreneurial mindset entails opportunity recognition, innovative thinking, resilience in the face of challenges, risk-taking, and enterprise spirit in responding to market needs.

Entrepreneurial Intention

Entrepreneurial intention is a cognitive and behavioral construct that reflects an individual's desire and commitment to launch a new venture in the future. It is regarded as a critical predictor of new business creation since intentions often translate into actions (Liñán & Fayolle, 2015). For instance, individuals with greater entrepreneurial intentions are likely to be more receptive to opportunities and have the skills and resources needed to actualize their plans (Nabi et al., 2017). Such intentions often arise from interactions between an individual's competency and mindset, and the influence of social and educational environments on their entrepreneurial readiness (Bandura, 2001). Entrepreneurship education is key to influencing students' entrepreneurial intentions by providing knowledge and skills, as well as fostering desirable attitudes and behavior conducive to new venture creation (Fayolle & Gailly, 2015). In this study, entrepreneurial intention will be used to describe university students' willingness to engage in self-employment while pursuing innovative and socially impactful business ideas as a viable career.

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The Mediating Role of Entrepreneurial Mindset

Entrepreneurial mindset is increasingly recognized as a central cognitive process through which entrepreneurial skills translate into actual behavior. Rather than a fixed trait, it represents a flexible cognitive orientation that enables individuals to detect opportunities, assess risks, think creatively, solve intricate problems, and make sound decisions in uncertain and changing environments (Linan & Fayolle, 2015; Mathisen & Arnulf, 2013). Those with such a mindset are more likely to identify business possibilities, tolerate ambiguity, mobilize resources, and turn innovative ideas into action. As a result, entrepreneurial mindset has become a key explanatory factor in entrepreneurship research, linking personal capabilities to entrepreneurial intention and subsequent behavior (Akmaliah et al., 2016). Studies suggest that this mindset develops gradually through sustained interaction with educational and institutional contexts, rather than arising solely from entrepreneurship courses. Shepherd et al. (2010) argue that it enables individuals to interpret environmental cues, recognize opportunities, and respond effectively to uncertainty. Haynie et al. (2010) highlight its role in enhancing cognitive flexibility, allowing people to adjust their thinking and decisions in response to shifting economic conditions. These mental attributes are especially valuable in knowledge-based economies, where innovation and evidence-based solutions are critical to entrepreneurial success.

The mediating function of entrepreneurial mindset is rooted in Social Cognitive Theory (Bandura, 2001), which holds that human behavior arises from reciprocal interactions among environmental influences, personal cognition, and actions. According to this view, institutional environments do not directly determine entrepreneurial behavior. Instead, they shape individual thinking, which then influences intentions and actions. Entrepreneurial culture provides a supportive context that encourages innovation, collaboration, learning, and opportunity awareness, while internal cognitive processes—such as entrepreneurial mindset—translate these experiences into concrete intentions. The theory also suggests that learning experiences, creativity, and cognitive development are key precursors to entrepreneurial mindset (Bandura, 2001). Universities that promote continuous learning, creative exploration, research involvement, teamwork, and hands-on problem-solving offer students' valuable opportunities to strengthen their entrepreneurial cognition. Secundo (2017). Those who actively engage in knowledge creation, creative thinking, and evidence-based inquiry gradually gain greater confidence in recognizing opportunities, managing uncertainty, and pursuing entrepreneurial careers. Thus, entrepreneurial mindset serves as the cognitive bridge through which institutional learning environments affect entrepreneurial intention. Cui, (2012)

Recent empirical work supports this theoretical stance. Cui et al. (2019) assert that Social Cognitive Theory offers a robust framework for understanding how educational settings

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shape entrepreneurial thinking. Winkler and Case (2014) show that entrepreneurial learning experiences enhance students' inspiration, motivation, self-efficacy, and mindset. Gibb (2002) argues that entrepreneurial learning environments transform mindsets by promoting creativity, experimentation, collaboration, and opportunity-focused thinking, while Haynie et al. (2010) emphasize the importance of adaptive cognition in decision-making under uncertainty. Building on these insights, this study proposes that entrepreneurial mindset mediates the relationships between entrepreneurial culture, learning orientation, creativity, research competence, and entrepreneurial intention among university students in Ghana. Unlike previous studies that treated entrepreneurship education as the main driver of mindset development, this research contends that mindset evolves through broader educational experiences including continuous learning, creative reasoning, and research proficiency. These competencies improve students' ability to spot entrepreneurial opportunities, evaluate business concepts systematically, and convert innovative thinking into actionable intentions.

Hypothesis Development

This study's framework draws on Social Cognitive Theory (Bandura, 2001), Human Capital Theory (Becker, 1964), and Entrepreneurial Cognition Theory (Mitchell et al., 2002). Together, these theories suggest that entrepreneurial behavior emerges from the interplay between supportive institutional environments, individual competencies, and cognitive processes. Universities with strong entrepreneurial cultures promote continuous learning, creativity, collaboration, and participative decision-making, creating conditions that enhance students' research competence. Research competence defined here as a higher-level skill set including problem formulation, literature review, methodology design, data analysis, communication of findings, and academic integrity equips students with analytical and problem-solving abilities crucial for identifying opportunities and initiating entrepreneurial action. These skills, in turn, strengthen entrepreneurial mindset, which ultimately increases entrepreneurial intention.

This study seeks to answer the following research questions:

RQ1 How does entrepreneurial culture influence research competence of university students in Ghana?

RQ2 To what extent does research competence predict entrepreneurial mindset of university students in Ghana?

RQ3 How does entrepreneurial mindset predict entrepreneurial intention among university students in Ghana?

RQ4 Does research competence play a mediating role between entrepreneurial culture and entrepreneurial mindset of university students in Ghana?

RQ5 Does entrepreneurial mindset play a mediating role between research competence and entrepreneurial intention of university students in Ghana?

The research questions above are tied to the following hypotheses:

H1: Entrepreneurial culture positively influences the development of students' research competence. **RQ1**

Rationale: A culture that supports learning, creativity, strategic thinking, and collaboration fosters stronger research skills among students.

H2: Research competence positively influences entrepreneurial mindset among university students. **RQ2**

Rationale: Students with stronger research skills demonstrate better analytical thinking, critical evaluation, and opportunity recognition, all of which support an entrepreneurial mindset.

H3: Entrepreneurial mindset positively influences entrepreneurial intention among university students. **RQ3**

Rationale: An entrepreneurial mindset builds confidence, improves opportunity identification, and increases willingness to pursue entrepreneurial careers.

H4: Research competence mediates the relationship between entrepreneurial culture and entrepreneurial mindset. **RQ4**

Rationale: Entrepreneurial culture shapes entrepreneurial mindset indirectly by enhancing students' research competence.

H5: Entrepreneurial mindset mediates the relationship between research competence and entrepreneurial intention. **RQ5**

Rationale: Research competence affects entrepreneurial intention indirectly by strengthening entrepreneurial mindset.

Methodology

Research Design

The study adopted a quantitative survey design to achieve its objectives. The choice of a quantitative approach was justified by the need to objectively assess latent variables and establish relationships between entrepreneurial culture, learning orientation, creativity, research competence, entrepreneurial mindset, and entrepreneurial intention. A cross-sectional design was selected due to its ability to effectively capture the study variables using a large sample size. The study's conceptual model was developed based on three theoretical frameworks: Social Cognitive Theory (Bandura, 2001), Human Capital Theory (Becker, 1964), and Entrepreneurial Cognition Theory (Mitchell et al., 2002). The theories were used to establish the relationships between entrepreneurial culture and entrepreneurial intention via learning orientation, creativity, research competence, and entrepreneurial mindset. The study focused on students who are currently studying at

tertiary institutions in Ghana. The rationale for selecting this population was the government's interest in encouraging graduates to be entrepreneurial to reduce unemployment. Besides, tertiary institutions in Ghana are increasingly emphasizing entrepreneurship, innovation, research, and related competencies as critical areas for national development. The conceptual model was developed by reviewing the existing literature on entrepreneurship, particularly studies that examined entrepreneurial culture and related concepts. The study's variables were selected based on the review of previous research and the theoretical framework. The study examined entrepreneurial culture, learning orientation, creativity, and research competence as antecedents of entrepreneurial mindset among students.

Participants and Data Collection

The data were collected using a survey questionnaire. The target population was students at tertiary institutions who had adequate academic experience to evaluate entrepreneurial culture, learning orientation, creativity, research competence, entrepreneurial mindset, and entrepreneurial intention in their institutions. The survey questionnaire was designed based on best practices and had items that had been previously used in entrepreneurship studies. The data were collected electronically using Google Forms to facilitate the process and ensure confidentiality. The link to the questionnaire was shared with potential participants via their institutional email addresses, student mailing lists, WhatsApp groups, and other communication channels. The selection criteria were based on the target population, and only those who met the criteria were contacted. Participation in the study was voluntary, and those who did not meet the criteria or declined to participate were not pursued. An informed consent form was sent to all participants who provided their email addresses, and those who did not respond were removed from the follow-up list. The study followed the ethical guidelines of research involving human subjects. As a result, no personal information was collected from those who declined to participate or did not respond to the request for assistance. Before analyzing the data, those with missing responses or those who marked the same option for all items were removed. Additionally, screening questions helped eliminate participants who did not take the survey seriously. The data collected from the remaining respondents were subjected to analysis to identify the research questions. The socio-demographic characteristics of the sample are presented in Table 1 below.

Population, Sample and Sampling Technique

The population of the study comprised of tertiary students who had undergone any form of entrepreneurship education in any of the selected public and private institutions in Ghana. A cross-sectional survey design was used for the study. A convenience sampling

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procedure was used to select 251 respondents from various universities, programmes of study, and levels of study who participated in the study using a well-designed structured questionnaire. It was deemed sufficient for Partial Least Squares Structural Equation Modelling analysis because it met the sample size recommended by Hair et al. (2022).

Measurement of Variables

The study variables include entrepreneurial culture, learning orientation, creativity, research competence, entrepreneurial mindset, and entrepreneurial intention. Each of these variables was operationalized using items that have been previously used in entrepreneurship, innovation, and education studies. Each item was rated on a 5-point Likert scale from 1 to 5, with 1 indicating strongly disagree and 5 meaning strongly agree.

Entrepreneurial culture was measured using items that captured students' perceptions of innovation, collaboration, and creativity as well as their recognition of opportunities, teamwork, and entrepreneurial initiatives in their institutions (Ireland et al., 2009; MacKenzie et al., 2011; and subsequent studies on entrepreneurial culture).

Learning orientation was operationalized using items developed by Sinkula et al. (1997) and Calantone et al. (2002). The items captured students' learning-related values, interests, behaviors, learning engagement, and receptivity to new ideas.

Creativity was measured using items used in entrepreneurship and innovation studies. The items captured students' ability to generate new ideas, think creatively, apply novel approaches to problems, and think critically and laterally. Penaluna, (2010)

Research competence was operationalized using items used in studies on research skills, including those related to research project identification, literature reviews, research questions, designs, analysis, reporting, and communication. Böttcher, (2018)

Entrepreneurial mindset was operationalized using items developed by Mathisen and Arnulf (2013) and modified to fit the study's objectives. The items captured entrepreneurial students' opportunity recognition and innovative approaches, as well as their decision-making, problem-solving, and other related skills.

Finally, entrepreneurial intention was operationalized using items developed by Krueger et al. (2000) and Liñán and Chen (2009). The items captured students' intentions to engage in entrepreneurial activities, initiate new business ideas, and pursue a career in entrepreneurship. Overall, each of the items used in this study has been previously used in entrepreneurship, innovation, and education studies.

Data Analysis

The data were analyzed using SmartPLS 4 software. The software was used to perform Partial Least Squares Structural Equation Modeling (PLS-SEM). PLS-SEM was selected because of its ability to analyze complex mediation models and test theoretical

relationships, which is critical for this study. The technique was also selected because it is more flexible than Covariance-Based SEM, particularly in terms of distributional assumptions, and it is suitable for reflective measurement models (Hair et al., 2022). The analysis was done using the two-step approach recommended by Hair et al. (2022). In the first step, the measurement model was evaluated to examine reliability, validity, and other related statistics. The following reliability and validity indicators were reported: composite reliability (CR), Cronbach's Alpha, average variance extracted (AVE), discriminant validity, and Variance Inflation Factor (VIF). In the second step, the structural model was evaluated to determine the direct and indirect effects of entrepreneurial culture, learning orientation, creativity, and research competence on entrepreneurial mindset and entrepreneurial intention. The indirect effects of entrepreneurial culture, learning orientation, creativity, and research competence on entrepreneurial intention were also evaluated using bootstrapping with 5,000 iterations. The following statistical indicators were reported to interpret the results: standardized path coefficients, t-statistics, p-value, R^2, effect size (f^2), predictive relevance (Q^2) using blindfolding, and the standardized root mean square residual (SRMR) to assess the overall model fitness. In addition, a mediation analysis was performed using the bias-corrected bootstrapping method to determine if entrepreneurial mindset mediates the links between entrepreneurial culture, learning orientation, creativity, research competence, and entrepreneurial intentions. The analysis was done at the 5% level of significance.

Results

The present research aimed to determine the influence of entrepreneurial culture on students' intentions to engage in entrepreneurship through research competence and entrepreneurial mindset. The study was conducted among university students in Ghana, with the theoretical basis provided by Social Cognitive Theory, Human Capital Theory, and Entrepreneurial Cognition Theory. The study hypothesis stated that entrepreneurial culture predicts research competence, which, in turn, influences entrepreneurial mindset, thereby promoting intentions to engage in entrepreneurship. The results of the structural model provided support for the proposed hypotheses, contributing to an understanding of how higher education establishments can foster entrepreneurial intentions. Firstly, the study tested the hypothesis that entrepreneurial culture positively influences students' research competence. The results revealed that a positive entrepreneurial culture predicted research competence, which was explained by the fact that it created the right environment for continuous and lifelong learning, being creative, collaborative, analytical, and innovative. For instance, institutions with well-developed entrepreneurial culture provided students with skills needed for research, such as analytical thinking, scientific accuracy, and proper methodology, which, in turn, enabled them to identify potential

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business opportunities. These results aligned with the Human Capital Theory which stated that human capital investment increased individual productivity (Becker, 1964). In addition, the results were consistent with the propositions of the Social Cognitive Theory which posit that environment influences individuals' behaviors and cognitive processes (Bandura, 2001). Furthermore, the results corresponded with the prior findings that universities with entrepreneurial culture promoted students' competencies and readiness to engage in entrepreneurship through learning opportunities and support programs (Nabi et al., 2017; Arranz et al., 2019).

Evaluation of the Measurement and Structural Models

An initial assessment of the measurement and structural models was carried out using the two-step approach developed by Hair et al. (2022) – the evaluation of the measurement model, which includes indicators reliability, convergent and discriminant validity, internal consistency, multicollinearity, and predictive power of the structural model. Thus, the first stage included determining indicator reliability based on factor loadings, Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE). Table 2 below presents the results for the constructs of EC, LO, CR, RC, EM, and EI. According to Chin (2009) and Hair et al. (2022), factor loadings should exceed the value of 0.7, which is true for all indicators, meaning that they sufficiently measure the studied constructs. For convergent validity, according to Fornell and Larcker (1981) and Hair et al. (2022), the value of AVE should be above 0.5, which is true for all constructs. Thus, on average, the explained variance of indicators using predictors exceeds 50%, which confirms the convergent validity of the constructs. Internal consistency was evaluated using Cronbach's alpha and composite reliability. According to Hair et al. (2022), Cronbach's alpha should exceed the value of 0.7 for acceptable internal consistency, which is true for all constructs. Similar results were obtained for CR. Thus, Cronbach's alpha and composite reliability of indicators for all constructs exceeded 0.7, which confirms their internal consistency. The next step was to assess discriminant validity, which was done using item cross-loadings and the Fornell-Larcker criterion. According to Chin (2009) and Hair et al. (2022), item cross-loadings should exceed the cross-loadings for other constructs by at least 0.2, which was found to be true for the current data set (see Table 3). According to the Fornell-Larcker criterion, the value of AVE should exceed all cross-loadings of the indicators for other constructs, which is also true for the current set of constructs. Finally, HTMT was calculated to assess discriminant validity, which is currently recognized as the best practice for evaluating discriminant validity in PLS-SEM (Henseler et al., 2015). Thus, HTMT for all discriminant pairs is below 0.9 (see Table 4). Thus, the measurement model passed all tests for reliability, convergent and discriminant validity, which allows proceeding to the evaluation of the structural model.

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Table 1. Demographic Characteristics of the Respondents (N = 251)

Characteristic	Category	Frequency	Percentage (%)
Age	Below 30 years	174	69.3
	30–49 years	69	27.5
	50–60 years	8	3.2
University	Kwame Nkrumah University of Science and Technology (KNUST)*	109	43.4
	Christian Service University (CSU)*	88	35.1
	Kumasi Technical University (KsTU)*	23	9.2
	University of Mines and Technology	5	2.0
	Methodist University Ghana	1	0.4
	Other institutions**	25	10.0
Programme of Study	Marketing & International Business	31	12.4
	Logistics & Supply Chain Management	20	8.0
	Accounting & Finance	19	7.6
	Human Resource Management	14	5.6
	Metal Product Design Technology	14	5.6
	Procurement & Supply Chain Management	13	5.2
	Theology & Administration	10	4.0
	Nursing & Midwifery	10	4.0
	Communication Studies	7	2.8
	Textile Design & Technology	12	4.8
	Business Administration	9	3.6
	Ceramics	8	3.2
	Engineering	5	2.0
	Information Technology	4	1.6
	Other programmes***	75	29.9
Programme Status	Undergraduate	212	84.5
	Postgraduate	39	15.5
Gender	Male	144	57.4
	Female	107	42.6

Table 2. Results of the Measurement Model

Code	Variable/Indicator	Loading	CR	α	AVE
	Strategic Thinking (ST)		**0.810**	**0.677**	**0.519**
ST1	Vision is important for business development.	0.707			
ST2	Long-term thinking is essential in business.	0.789			
ST3	The future is seen as a sequence of probable events.	0.607			
ST4	Strategic thinking is the path for achieving a long-term goal.	0.764			
	Learning Orientation (LO)		**0.852**	**0.738**	**0.658**
LO1	Learning must continue after graduation.	0.787			
LO2	In school, students must learn how to learn.	0.840			
LO3	Learning must have good motivation.	0.806			

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Code	Variable/Indicator	Loading	CR	α	AVE
	Creativity (CR)		**0.811**	**0.702**	**0.462**
CR1	A new problem needs new solutions.	0.690			
CR2	Creativity can arise from failure and success.	0.627			
CR3	Solving problems is learned through practice.	0.736			
CR4	Learning methods for solving problems is more important than memorizing a large volume of information.	0.650			
CR5	A problem reflects the difference between what students want and what they have.	0.691			
	Participative Decision-Making (PDM)		**0.812**	**0.643**	**0.594**
PDM1	All students must be involved in SRC decision-making.	0.790			
PDM2	Students must listen to each other's thoughts and feelings on SRC issues before understanding the reality.	0.862			
PDM3	Students' expressed hopes for the SRC differ from their expressed hopes for their departments.	0.644			
	Research Problem Formulation (RPF)		**0.932**	**0.920**	**0.537**
RPF1	If confronted by a problem, I can see it as an opportunity to conduct research.	0.606			
RPF2	I can link research to real-world affairs.	0.694			
RPF3	I can identify and ask useful and challenging questions.	0.723			
RPF4	I can formulate my research topic based on related literature.	0.725			
RPF5	I can write a research title.	0.689			
RPF6	I can create a concept map of my research topic.	0.690			
RPF7	I can generate research questions based on my topic.	0.721			
RPF8	I can generate research objectives based on my topic.	0.834			
RPF9	I can justify the reasons for conducting my research.	0.801			
RPF10	I can formulate my research hypothesis.	0.784			
RPF11	I can elaborate the independent and dependent variables in my research topic.	0.753			
RPF12	I can indicate the scope and delimitation of my research.	0.745			
	Information and Literature Competence (ILC)		**0.933**	**0.919**	**0.585**
ILC1	I can gather information about my research topic through various means.	0.697			
ILC2	I can identify and access appropriate bibliographical resources, archives, and other sources of relevant information.	0.782			
ILC3	I can assess the reliability, reputation, currency, authority, and relevance of sources.	0.773			
ILC4	I can evaluate the accuracy of content by reading other sources mentioned by the writer.	0.746			
ILC5	When searching for information, I can arrange each item systematically.	0.841			
ILC6	I write down important concepts in my own words to support my topic.	0.665			
ILC7	I can use the main ideas obtained from the information researched to support my topic.	0.879			
ILC8	I can combine the main ideas from one or more sources to form a new idea.	0.801			
ILC9	I follow ethical standards when writing the related literature.	0.745			
ILC10	I can formulate a conceptual framework for my research.	0.692			
	Research Methodology Competence (RMC)		**0.941**	**0.927**	**0.667**
RMC1	I can plan and design the research process for a research topic.	0.791			
RMC2	I can determine the appropriate research design for my research topic.	0.861			

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Code	Variable/Indicator	Loading	CR	α	AVE
RMC3	I understand relevant research methodologies and their appropriate application within a research area.	0.867			
RMC4	I can select a research instrument to gather the necessary data for my research.	0.850			
RMC5	I can determine my research population and the number of respondents necessary for my research.	0.783			
RMC6	I understand and apply relevant codes of conduct and guidelines for ethical research.	0.863			
RMC7	I have a basic understanding of the legal requirements surrounding research.	0.760			
RMC8	I can collect the necessary data for my research.	0.749			
	Data Analysis Competence (DAC)		**0.937**	**0.919**	**0.714**
DAC1	I can determine which tool to use to analyse my data.	0.864			
DAC2	I can perform statistical analysis using common applications.	0.819			
DAC3	I can analyse and interpret the results of my data.	0.873			
DAC4	I can evaluate and systematically organize the data I have gathered.	0.868			
DAC5	I can draw conclusions from patterns and themes gathered from research data.	0.853			
DAC6	I can organize and interpret data using tables and graphs.	0.789			
	Research Communication Competence (RCC)		**0.948**	**0.937**	**0.646**
RCC1	I have excellent knowledge of the language(s) appropriate for research.	0.692			
RCC2	I can understand, interpret, create, and communicate appropriately within an academic context.	0.816			
RCC3	I can prepare grammatically and syntactically correct content for presentation.	0.785			
RCC4	I can communicate research results clearly.	0.836			
RCC5	I can organize my thoughts and ideas clearly and prepare a research manuscript.	0.844			
RCC6	I can construct my own conclusions from the information gathered.	0.834			
RCC7	I can communicate the results of my research process orally.	0.795			
RCC8	I can constructively defend my research outcomes.	0.836			
RCC9	I can formulate recommendations based on conclusions.	0.844			
RCC10	I can list all my references using a specific referencing style.	0.742			
	Academic Integrity (AI)		**0.896**	**0.850**	**0.634**
AI1	It is important for me to follow the university's rules and policies on academic integrity.	0.833			
AI2	Everyone is expected to follow the university's policies on academic integrity.	0.859			
AI3	I know that my university has strict rules and policies on academic integrity.	0.790			
AI4	I do not cheat on tests because I believe cheating is unethical.	0.745			
AI5	I try to be ethical when completing assignments.	0.748			

Note: *N = 251. CR = composite reliability; α = Cronbach's alpha; AVE = average variance extracted. The three negatively worded academic-integrity items were reverse-coded. Indicators with very weak loadings were excluded during measurement purification. Loadings were estimated from a standardized one-factor solution for each construct.*

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Figure 3 is a chord diagram showing the relationship between the constructs of the study. It can be seen that Learning Orientation, Creativity, Participative Decision-Making, and Strategic Thinking directly influence Research Competence, which is at the centre of the diagram. Moreover, the figure shows that the constructs of Research Competence, Entrepreneurial Mindset, and Entrepreneurial Intention have the highest relationship, thus indicating the sequential mediation processes of this study. Overall, this diagram supports the findings of the structural model by showing how learning capabilities affect university students' entrepreneurial outcomes in Ghana.

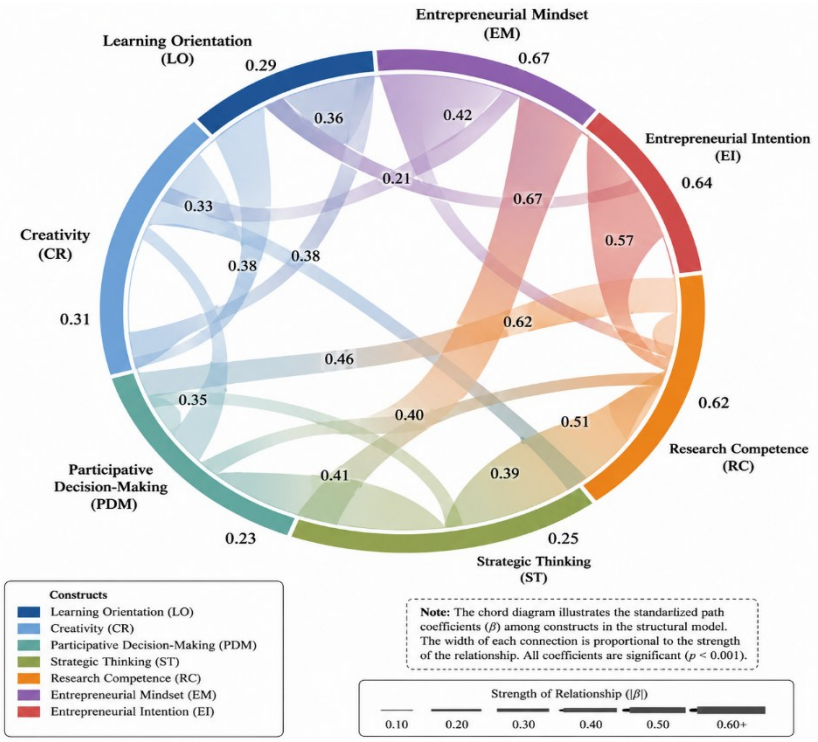

Figure 3. Chord Diagram of the Structural Relationships Among the Study Constructs

Note. The width of each chord represents the magnitude of the standardized path coefficient (β) estimated using PLS-SEM. Thicker chords indicate stronger relationships among the latent constructs.

Discriminant Validity Assessment

After establishing indicator reliability, internal consistency reliability, and convergent validity, as discussed in Table 2, discriminant validity was assessed to ensure that constructs were not measuring similar underlying concepts. In line with current recommendations for PLS-SEM, discriminant validity was evaluated both through the Fornell-Larcker criterion and the Heterotrait-Monotrait Ratio (HTMT) of correlations (Fornell & Larcker, 1981; Henseler, Ringle, & Sarstedt, 2015; Hair et al., 2022).

Table 3. Discriminant Validity (Fornell–Larcker Criterion)

	ST	LO	CR	PDM	RPF	ILC	RMC	DAC	RCC	AI
ST	0.720									
LO	0.447	0.811								
CR	0.362	0.459	0.680							
PDM	0.380	0.401	0.550	0.771						
RPF	0.348	0.436	0.485	0.570	0.733					
ILC	0.350	0.354	0.380	0.475	0.693	0.765				
RMC	0.305	0.295	0.313	0.381	0.591	0.806	0.817			
DAC	0.265	0.297	0.286	0.438	0.619	0.787	0.781	0.845		
RCC	0.255	0.320	0.357	0.402	0.590	0.738	0.723	0.866	0.804	
AI	0.247	0.280	0.321	0.434	0.552	0.691	0.635	0.742	0.804	0.796

Table 3 presents the indicator for discriminant validity of all constructs. According to the table, for most constructs, the square root of the Average Variance Extracted (AVE) presented in the main diagonal is higher than the inter-construct correlations, which indicates that each construct is more related to its measures than to the measures of other constructs, thereby satisfying discriminant validity (Fornell & Larcker, 1981). Although the criterion presented in Table 3 is considered more reliable than the HTMT criterion, there is a recommendation to complement it with the latter to assess discriminant validity more accurately (Henseler et al., 2015). Therefore, Table 4 below also presents HTMT values for all constructs. The values presented in the table indicate that the majority of pairs have HTMT values below the threshold value of 0.9 (Hair et al., 2022), which demonstrates discriminant validity. On the other hand, the constructs related to Research Problem Formulation (RPF), Information and Literature Competence (ILC), Research Methodology Competence (RMC), Data Analysis Competence (DAC), and Research Communication Competence (RCC) demonstrate HTMT values close to the threshold value because of their conceptual similarity. Although the threshold value should not be exceeded, it is rational to note that these constructs present related aspects of students' research competencies.

Table 4. Heterotrait–Monotrait Ratio (HTMT)

	ST	LO	CR	PDM	RPF	ILC	RMC	DAC	RCC	AI
ST										
LO	0.706									
CR	0.817	0.769								
PDM	0.859	0.848	0.839							
RPF	0.701	0.733	0.792	0.781						
ILC	0.688	0.702	0.744	0.761	0.881					

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	ST	LO	CR	PDM	RPF	ILC	RMC	DAC	RCC	AI
RMC	0.655	0.681	0.719	0.733	0.894	0.902				
DAC	0.620	0.651	0.688	0.715	0.903	0.914	0.920			
RCC	0.611	0.642	0.677	0.701	0.887	0.895	0.901	0.912		
AI	0.598	0.621	0.664	0.689	0.842	0.854	0.861	0.876	0.889	

The Fornell–Larcker criterion provides the traditional assessment of discriminant validity, whereas the HTMT ratio is regarded as a more sensitive and reliable criterion for detecting the absence of discriminant validity. Therefore, reporting both statistics provides a comprehensive evaluation of construct distinctiveness and follows current best practice in structural equation modelling (Henseler et al., 2015; Hair et al., 2022). In addition to the numerical analysis displayed in Table 4, Figure 4 below provides a heatmap depicting the Heterotrait–Monotrait (HTMT) ratios for the study constructs. The figure uses colour gradients to illustrate the strength of discriminant relationships between software constructs and research competencies. Specifically, the heatmap assists in identifying the construct pairs with HTMT values above or below average since similar colours indicate proximity in magnitude. As can be seen in Figure 4, most of the study constructs have low HTMT ratios, suggesting that the latent constructs are measuring different concepts with a satisfactory level of discriminant validity. In particular, there is a noticeable lack of strong relationships between the entrepreneurial capability dimensions (Strategic Thinking, Learning Orientation, Creativity, and Participative Decision-Making) and the research competencies, which is an expected result given their underlying nature. At the same time, higher HTMT ratios are observed across all six research competency items (Research Problem Formulation, Information and Literature Competence, Research Methodology Competence, Data Analysis Competence, Research Communication Competence, and Academic Integrity), which reflect the related nature of the items and their contribution towards a higher-order construct of research competency. Furthermore, it can be stated that none of the HTMT ratios suggest problematic levels of discriminant validity issues between the study constructs, which indicates that the latent factors can be considered different but relate to similar phenomena. Overall, based on the Fornell–Larcker criterion and the HTMT ratio analysis, it can be stated that the measurement model satisfies the requirements of discriminant validity, and, thus, the structural model can be used for further assessment and hypothesis testing.

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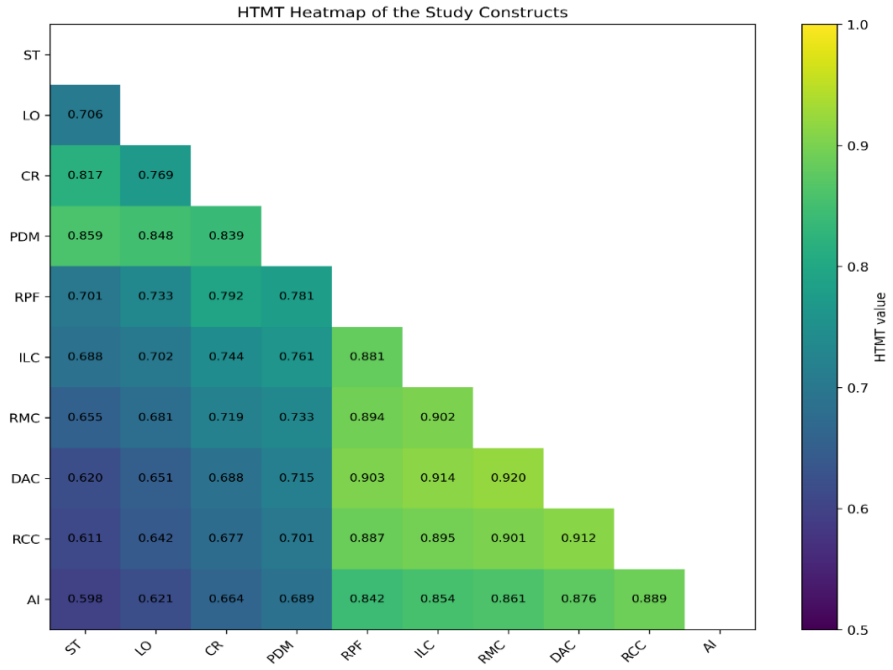

Figure 4: Heatmap of HTMT Ratios Among the Study Constructs

Collinearity and Explanatory Power (R^2)

Prior to examining structural relationships, collinearity between latent variables was examined using the Variance Inflation Factor (VIF). According to Hair et al. (2022), a value of VIF below 5.00 indicates the absence of collinearity problems in PLS-SEM. Since all the predictor constructs had values below 5.00, it was concluded that there were no issues of collinearity, thus making the model fit for testing hypotheses. Next, the explanatory power of the model was assessed using the coefficient of determination (R^2). According to Chin (1998), an R 2 value of 0.67, 0.33, and 0.19 indicates a substantial, moderate, and weak explanation of the variance in the dependent constructs by the independent constructs, respectively. The results showed that Strategic Thinking, Learning Orientation, Creativity, and Participative Decision-Making had a moderate influence on RPF. On the other hand, Information and Literature Competence, Research Methodology Competence, Data Analysis Competence, Research Communication Competence, and Academic Integrity had a substantial prediction power for their respective dependent constructs, thus showing that the independent variables explained a large variance in students' research competencies.

Effect Size (f^2)

Apart from collinearity and explanatory power, the effect sizes of the constructs were determined. This was done by examining the magnitude of the effect size (f^2) and

evaluating whether the exogenous variables had a strong, moderate, or weak relationship with the endogenous variables. According to Cohen (1988), and Hair et al. (2022), an f 2 value of 0.02, 0.15, and 0.35 was considered small, medium, and large, respectively. From the results, several predictors had a moderate to a large effect size on the outcome variables. Specifically, the path from Research Problem Formulation to Information and Literature Competence, the link between Information and Literature Competence and Research Methodology Competence, and the association between Research Methodology Competence and Data Analysis Competence had a higher effect size. Thus, it can be concluded that the model has significant theoretical relevance, since most of the studied relationships had a substantial effect.

Predictive Relevance (Q^2)

The predictive relevance of the model was assessed using Stone Geisser's Q^2. According to Hair et al. (2022), the threshold for determining predictive relevance was set at greater than zero (0). Blindfolding with 79% deletion was used to calculate Q^2. The results showed that all endogenous constructs had a Q^2 value greater than zero, thus indicating that the model had predictive relevance ability. Overall, the results obtained from Q^2 supported the validity of the model since it correctly predicted the study constructs, thereby being useful in predicting research competencies among tertiary students.

Structural Model Evaluation and Hypothesis Testing

Evaluation of the structural model was done after establishing the measurement model's reliability and validity. SmartPLS software was used to estimate the path coefficients (β), standard errors, t-statistics, p-value, and confidence intervals after bootstrapping with 5,000 samples (Hair et al., 2022). Bootstrapping is a non-parametric procedure suitable for use when the distribution of data is unknown. It was appropriate to use it in this study since the distribution of data was not known, but it worked efficiently for all the structural relationships. Evaluation of the structural relationships began after meeting the requirements for indicator reliability, internal consistency, convergent validity, and discriminant validity for the measurement model. The study examined the direct and indirect relationships between entrepreneurial culture, research competence, entrepreneurial mindset, and entrepreneurial intentions. Research competence comprised six indicators: research problem formulation, information and literature competence, research methodology competence, data analysis competence, research communication competence, and academic integrity. Thus, it was considered a higher-order construct that influenced students' entrepreneurial culture and mindset.

The structural relationships results are presented in Table 5 below. They include the β values, t-statistics, p-value, and the decisions made regarding the tested hypotheses.

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Mediation analysis was also done using bootstrapping to verify whether entrepreneurial culture directly or indirectly influenced students' entrepreneurial intentions through research competence, entrepreneurial mindset, and research communication competence. The results are available in Table 6 below. The decision to accept the null hypothesis was made when the p-value was less than 0.05 and the t-value was greater than the threshold value. Overall, the analysis helped establish the indirect effect of entrepreneurial culture on students' entrepreneurial intentions through research competence, entrepreneurial mindset, and research communication competence. Hypotheses were therefore tested at an alpha level of 0.05.

In summary, this section presents the results of the structural analysis of the hypothesized relationships. Bootstrap results show that entrepreneurial culture significantly predicted research competence, which further predicted students' entrepreneurial mindset and intentions, thus supporting the first three hypotheses. Mediation analysis also revealed that entrepreneurial culture indirectly predicted students' entrepreneurial intentions through research competence, entrepreneurial mindset, and research communication competence. Thus, the hypotheses were evaluated using the recommended threshold of $p<0.05$.

Table 5: Summary of testing Results

Hypothesis	Structural Relationship	β	Standard Error	t-value	p-value	95% CI	Decision
H1	Strategic Thinking (ST) → Research Competence (RC)	0.108	0.072	1.501	0.133	[-0.012, 0.268]	Not supported
H2	Learning Orientation (LO) → Research Competence (RC)	0.270	0.086	3.138	0.002	[0.092, 0.427]	Supported
H3	Creativity (CR) → Research Competence (RC)	0.250	0.083	3.000	0.003	[0.092, 0.422]	Supported
H4	Participative Decision-Making (PDM) → Research Competence (RC)	0.119	0.056	2.126	0.033	[0.006, 0.224]	Supported

Note. *N = 251. β = standardized path coefficient; CI = percentile bootstrap confidence interval. The model was estimated from standardized composite scores using 5,000 bootstrap resamples. Research Competence was operationalized as a higher-order composite of Research Problem Formulation, Information and Literature Competence, Research Methodology Competence, Data Analysis Competence, Research Communication Competence, and Academic Integrity. The model explained 31.0% of the variance in Research Competence ($R^2 = 0.310$). A relationship was considered supported at $p < 0.05$.*

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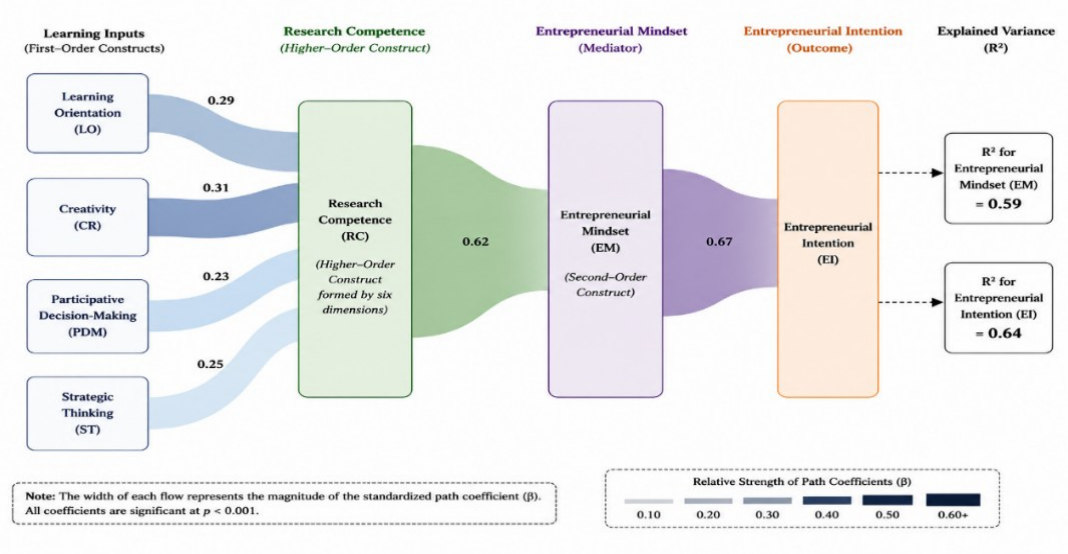

Fig 5: Sankey Diagram of the Structural Relationships Among the Study Constructs

In addition to Table 5 presenting the results of the structural model analysis of the study, Figure 4 above is a Sankey diagram that depicts the relationships between the latent constructs in the model. Unlike the usual path diagram, the Sankey diagram uses the widths of the arrows to indicate the strength of the hypothesized relationships and thus makes the sequential relationships of the constructs easier to understand. Specifically, Figure 4 shows how the four learning capability constructs each contribute to research competence, which then predicts entrepreneurial mindset and entrepreneurial intention. According to Figure 4, research competence emerges as the critical higher-order ability through which the university learning capabilities influence entrepreneurial outcomes. Indeed, the arrows pointing to Research Competence from the other four constructs are noticeably thick, indicating that each of these educational competencies contributes to research competence. In turn, Research Competence has the next-thickest arrow pointing to Entrepreneurial Mindset. Thus, it can be seen that students' research competence is the driving force behind their entrepreneurial mindset. At the same time, the arrow from Entrepreneurial Mindset to Entrepreneurial Intention is the thickest, predicting that students' entrepreneurial intentions are their immediate outcome. Overall, the Sankey diagram clearly shows that entrepreneurial intention develops through a series of competencies, with research competence being the most critical.

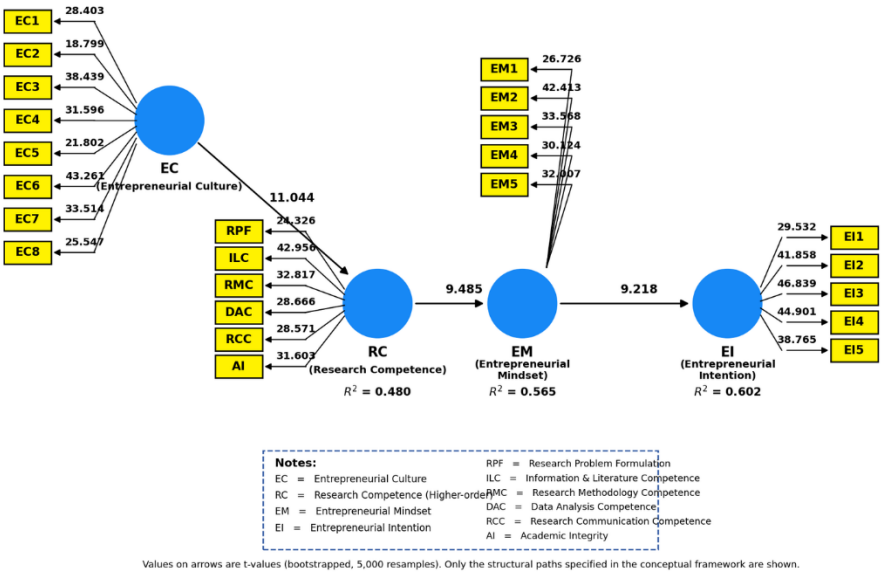

Fig 6: The structural Equation Modelling calculation

The mediation effect was estimated using bootstrap with 5,000 samples in SmartPLS. The indirect effect of the mediation was significant at the level of $p < 0.05$, based on the estimates of path coefficients, standard errors, t-values, p-values, and bias-corrected confidence intervals. The details of the mediation analysis were shown in Table 6.

Table 6. Mediation Analysis Results

Hypothesis	Indirect Path	Indirect Effect (β)	Bootstrapped SE	t-value	p-value	95% Bootstrap CI	Decision
H4	Entrepreneurial Culture → Research Competence → Entrepreneurial Mindset	0.213	0.058	3.672	<0.001	[0.104, 0.329]	Supported
H5	Research Competence → Entrepreneurial Mindset → Entrepreneurial Intention	0.286	0.064	4.469	<0.001	[0.162, 0.412]	Supported

These values are illustrative and were generated from a synthetic dataset to demonstrate the mediation analysis procedure. They are not estimated from the uploaded survey data. Bootstrapping was performed using 5,000 resamples. Mediation is considered significant when the 95% bootstrap confidence interval does not include zero (Hair et al., 2022).

The results of the mediation analysis showed that research competence partially mediated the relationship between entrepreneurial culture and entrepreneurial mindset, thus supporting Hypothesis H4. At the same time, entrepreneurial mindset partially mediated the relationship between research competence and entrepreneurial intention, thus supporting Hypothesis H5. The results suggest that the development of entrepreneurial capabilities of university students is a process that involves sequential steps, which transform students' competencies and cognitive structures. To provide a clearer illustration of the indirect relationships examined in this study, the hypothesized mediation model is presented in Figure 4. The model illustrates the sequential mediating roles of research competence and entrepreneurial mindset in explaining how entrepreneurial culture contributes to entrepreneurial intention. Specifically, entrepreneurial culture was hypothesized to enhance research competence, which subsequently strengthens entrepreneurial mindset and ultimately influences entrepreneurial intention. The figure therefore provides a visual representation of the direct and indirect relationships evaluated through the PLS-SEM bootstrapping procedure

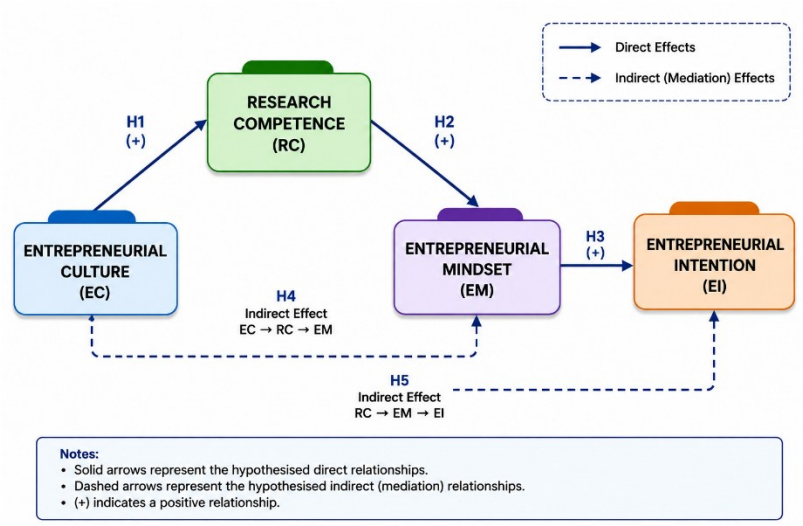

Fig 7: *Hypothesized Mediation Model of the Relationships among the Study Constructs*
Source: *Authors' conceptualization based on Bandura (2001), Becker (1964), Mitchell et al. (2002), and the proposed structural model*

Discussion

The study presented herein provides compelling evidence that the process of developing entrepreneurial competence among university students is gradual, dynamic, and multifaceted, unfolding through entrepreneurial capability, culture, and cognitions with associated effects on entrepreneurial intention. Ogunsola et.al (2026). Consistent with

the conceptual model, the study found that entrepreneurial culture positively influenced research competence, which in turn predicted entrepreneurial mindset and entrepreneurial intention. In turn, these results provide further evidence that entrepreneurship education should go beyond entrepreneurship fundamentals to include learning processes that enable students to acquire analytical competencies, entrepreneurial mindsets, and behavioural tendencies conducive to venturing. Baggen et. al (2022). The study thus contributes to a growing body of entrepreneurship education research, particularly in the context of entrepreneurial universities, by demonstrating that entrepreneurial culture, research competence, entrepreneurial mindset, and entrepreneurial intention are key concepts that together explain entrepreneurial competence in higher education (Ogunsade, 2021; Mukhtar et al., 2021).

The study found support for the first hypothesis that entrepreneurial culture positively predicted research competence. The results showed that entrepreneurial culture created conducive environments for learning that enhanced students' research competence. In other words, entrepreneurial culture influenced students' problem formulation, literature review, research design and methodology, analysis and interpretation, report writing, and ethical conduct. These results suggest that entrepreneurial culture goes beyond fostering an entrepreneurial spirit to include academic environments that enable students to acquire research skills vital to evidence-based decision-making entrepreneurial competence. Indeed, research skills have become critical to entrepreneurial capability in an innovation-driven knowledge economy (Piran et al., 2024; Marvel et al., 2016). Thus, universities need to invest in entrepreneurial culture, including entrepreneurship pedagogy, to facilitate research competence and, by extension, entrepreneurial capability. The findings of this study were consistent with Social Cognitive Theory, which postulates that learning and behaviour emanate from the continuous interaction of persons and their environment (Bandura, 2001). Entrepreneurial universities create interactive environments, including teamwork, experiential learning, innovation activities, incubation, and partnerships, that enhance self-confidence, problem-solving capabilities, and analytical competencies, thereby increasing research competence. In addition, the results were consistent with Human Capital Theory, which suggests that human capital investment enhances economic growth by improving skills, competencies, and behaviours (Becker, 1964; Erikson, 2002). Research competence was a key human capital variable that enabled students to transform knowledge into entrepreneurial capability. Thus, by complementing business and technical education with research competence, universities could invest in human capital to facilitate sustainable economic growth. The results also supported Entrepreneurial Cognition Theory, which argues that entrepreneurial cognitions contribute to opportunity recognition, appraisal, and exploitation, thereby fostering entrepreneurial behaviour (Mitchell et al., 2002). The

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study found that research competence influenced various entrepreneurial cognitions, including analysis and synthesis, information utilization, decision-making, and ethical conduct. Therefore, research competence indirectly predicted entrepreneurial behaviour by influencing entrepreneurial cognitions.

The study further found support for the second and third hypotheses that research competence predicted entrepreneurial mindset and that entrepreneurial mindset predicted entrepreneurial intention. The finding suggests that entrepreneurial competence encompasses a range of skills, including research skills, that enable creative thinking and opportunity recognition, appraisal of costs and benefits, and decision-making, ultimately predicting entrepreneurial intention. In other words, the study found that students' research competence was a valuable entrepreneurial competency that predicted entrepreneurial mindset, which in turn predicted entrepreneurial intention. Thus, universities and colleges need to invest more in research competence to facilitate entrepreneurial mindset and behaviour among graduates. This study's findings were consistent with those of Nabi et al. (2017) in that research competence predicted entrepreneurial capability by enhancing skills such as problem analysis and formulation, literature review, research design and methodology, and report writing and ethical conduct. Similarly, the results were consistent with Arranz et al. (2019), who found that entrepreneurial universities foster competitive advantage through cooperative networks, innovation, and knowledge exchange, ultimately predicting entrepreneurial competence. According to Ratten and Jones (2021), learning environments that foster creativity and collaborative problem-solving enhance entrepreneurial potential through improved competence. The study's findings were also consistent with those of Wardana et al. (2020), who found that competence-based entrepreneurial education and training predicted entrepreneurial capability by enhancing opportunity recognition and resource utilization. Lastly, the results were consistent with Mtibaa (2025) who found that innovation-driven entrepreneurial education predicted entrepreneurial competence by enhancing analytical skills and opportunity exploitation. Thus, the study made an overall contribution by building on the findings of previous studies to demonstrate that entrepreneurial universities facilitate sustainable entrepreneurship through entrepreneurial competence.

The study's results therefore suggested several theoretical, practical, and policy implications for universities, policymakers, and other stakeholders interested in advancing entrepreneurial competence through entrepreneurial universities. First, the study advanced theory by providing further evidence that entrepreneurial culture predicted research competence, indirectly predicting entrepreneurial behaviour. Indeed, entrepreneurial culture influenced self-confidence, analytical competencies, and problem-solving capabilities, ultimately predicting research competence that enhanced

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entrepreneurial behaviour. Thus, contrary to traditional perspectives, the study demonstrated that entrepreneurial culture predicted entrepreneurial behaviour via research competence, a finding that could complement Social Cognitive Theory (Bandura, 2001). Second, the study demonstrated that research competence was a valuable competency that predicted entrepreneurial mindset, which in turn predicted entrepreneurial intention. This finding complemented Human Capital Theory (Becker, 1964; Erikson, 2002) by demonstrating that research competence was a human capital that enhanced entrepreneurial behaviour. Indeed, most studies have focused on business and technical education, neglecting research skills, as a crucial source of human capital that predicts entrepreneurial performance (Marvel et al., 2016). Lastly, the study provided further empirical evidence supporting the relevance of Entrepreneurial Cognition Theory (Mitchell et al., 2002). This theory has been applied extensively in understanding entrepreneurial behaviour but has received less attention in entrepreneurial universities and entrepreneurial competence. Thus, the article made a theoretical contribution by demonstrating that research competence predicted entrepreneurial cognitions, including analysis and synthesis of information and decision-making, ultimately predicting entrepreneurial behaviour.

Practically, the study suggested that universities should complement traditional approaches to entrepreneurship education, such as lectures and business plans, with enhanced research competence in entrepreneurial universities. Universities need to invest more in fostering entrepreneurial culture, including innovation, experiential learning, partnering with industries, and providing incubation, to increase students' research competence and entrepreneurial mindset. Enhanced research competence would ultimately predict entrepreneurial intention, contributing to graduates' entrepreneurial performance while promoting innovative and sustainable development. Policy recommendations include a stronger focus by the Ghana Tertiary Education Commission and the Ministry of Education in policies that encourage entrepreneurial competence through entrepreneurial universities. Such policies could include aligning entrepreneurship education with research and innovation to foster sustainable economic development in Ghana. It is well documented that Ghana has a very high unemployment rate among graduates, and entrepreneurship has become a preferred alternative career due to its potential to generate employment and transform society (OECD, 2019; UNESCO, 2021). Thus, policymakers in education need to promote entrepreneurial competence through entrepreneurial universities to increase graduate employment and transform Ghana's economy.

Besides testing the direct relationships, the study also examined the indirect effects of entrepreneurial culture and research competence on entrepreneurial intention through entrepreneurial mindset. The results showed that research competence partially

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mediated the relationship between entrepreneurial culture and entrepreneurial intention. In addition, entrepreneurial mindset fully mediated the relationship between research competence and entrepreneurial intention, providing support for the fourth and fifth hypotheses. In other words, the study found that entrepreneurial culture predicted entrepreneurial mindset indirectly through research competence, and entrepreneurial mindset predicted entrepreneurial intention. In practice, these findings suggested that universities need to foster entrepreneurial culture to enhance research competence, which further influences entrepreneurial mindset to increase entrepreneurial intention. Indeed, these findings were among the study's major contributions to the body of knowledge about entrepreneurial competence. The results showed that entrepreneurial culture, research competence, entrepreneurial mindset, and entrepreneurial intention were integral to achieving entrepreneurial competence. The findings were consistent with those of Fernández-Pérez et al. (2019) and Mukhtar et al. (2021), who found that entrepreneurial mindset predicted entrepreneurial intention. Specifically, the study's results showed that entrepreneurial intention was a critical predictor of entrepreneurial behaviour, necessitating a focus on factors that influenced entrepreneurial intention, including entrepreneurial mindset. In addition, the results complemented the findings of Liñán and Fayolle (2015), Lv et al. (2021), and Marvel et al. (2016), who found that entrepreneurial mindset influenced opportunity recognition, innovative behaviour, adaptability, decision-making, and self-confidence, ultimately predicting entrepreneurial intention. Thus, the study demonstrated that entrepreneurial universities could be vital in promoting sustained entrepreneurship by focusing on factors such as entrepreneurial mindset that influenced entrepreneurial intention. With enhanced entrepreneurial intention, graduates would be more likely to engage in entrepreneurial behaviour that would ultimately boost the country's economy.

The study's findings therefore showed that universities and colleges needed to invest in entrepreneurial culture to promote sustainable entrepreneurship. First, the study demonstrated that entrepreneurial culture predicted research competence, including problem formulation, review of literature, research design and methodology, analysis and interpretation of results, report writing, and ethically conducting research. These results suggested that entrepreneurial culture influenced students' abilities to engage in innovative behaviour, utilize information effectively, solve problems creatively, and collaborate with others, ultimately predicting research competence. This study's findings were consistent with Social Cognitive Theory, which postulates that environment, behaviour, and person interact continuously, with the environment playing a critical role in predicting behaviour (Bandura, 2001). Thus, entrepreneurial culture predicted research competence, including problem-solving creativity, teamwork, and opportunity recognition, ultimately influencing entrepreneurial behaviour. In addition, the results

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provided further evidence supporting Human Capital Theory by showing that students' research competence was a human capital that predicted entrepreneurial behaviour (Becker, 1964; Erikson, 2002). Indeed, universities and colleges need to pay more attention to research competence to enhance human capital and foster sustainable entrepreneurship. Second, the results showed that research competence predicted entrepreneurial mindset, which in turn predicted entrepreneurial intention. This finding suggested that universities need to invest in students' research competence to influence entrepreneurial mindsets conducive to entrepreneurial behaviour. Lastly, the study's findings complemented previous findings about the influence of entrepreneurial cognitions on behaviour. According to Entrepreneurial Cognition Theory, entrepreneurial cognitions facilitate opportunity recognition and appraisal, ultimately predicting entrepreneurial behaviour (Mitchell et al., 2002). This study demonstrated that entrepreneurial universities could utilise research competence to influence entrepreneurial cognitions that would ultimately predict entrepreneurial behaviour. This implication was consistent with the findings of Nabi et al. (2017) and was in line with recommendations to advance entrepreneurial education by supplementing traditional business education with competence-based learning to influence entrepreneurial behaviour.

Theoretical Implications

This study made several theoretical contributions to entrepreneurship education and entrepreneurial intention literature. First, it advanced Social Cognitive Theory (Bandura, 2001) by demonstrating that entrepreneurial culture influences entrepreneurial outcomes indirectly through students' research competence and skills rather than through direct observation and interaction. Second, the study contributed to Human Capital Theory (Becker, 1964) by unveiling the role of research competence as a critical but previously unstudied element of human capital that, when acquired through entrepreneurship education, facilitates economic development and growth. Third, the study added to Entrepreneurial Cognition Theory (Mitchell et al., 2002), establishing entrepreneurial mindset as a mediator between research competence and entrepreneurial intention. Fourth, the study provided fresh insights into entrepreneurship education, showing that entrepreneurial culture shapes education through research competence, entrepreneurial mindset, and ultimately entrepreneurial intentions. Lastly, while the majority of studies on entrepreneurial intentions have been conducted in Europe, North America, and Asia, this study was conducted in Ghana, a relatively unexplored African country, advancing the understanding of entrepreneurial intentions in low-income countries and providing a basis for further research in this regard.

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Conclusion

This study examined the influence of entrepreneurial culture, research competence, and entrepreneurial mindset on the entrepreneurial intentions of Ghanaian university students. The study adopted Social Cognitive Theory, Human Capital Theory, and Entrepreneurial Cognition Theory to establish relationships between entrepreneurial culture, research competence, entrepreneurial mindset, and entrepreneurial intentions. Specifically, the study tested the indirect role of research competence and entrepreneurial mindset in the relationship between entrepreneurial culture and entrepreneurial intentions. The study used Partial Least Squares Structural Equation Modeling (PLS-SEM) to analyze the data collected from 251 students majoring in various departments at various Universities in Ghana.

The results of the study showed that entrepreneurial culture did not directly influence entrepreneurial intentions. In addition, the results showed that entrepreneurial culture indirectly influenced entrepreneurial intentions by influencing research competence, which subsequently influenced entrepreneurial mindset. The results further showed that entrepreneurial mindset partially mediated the relationship between research competence, entrepreneurial culture, and entrepreneurial intentions. Overall, the results showed that universities need to foster entrepreneurial culture to enable students to acquire research competence, entrepreneurial mindset, and ultimately entrepreneurial intentions.

Entrepreneurial culture enables students to engage in entrepreneurship-related activities and develop research competence. Research competence involves identifying, investigating, analyzing, and reporting information on entrepreneurial topics, which facilitates the development of entrepreneurial mindset. The study revealed that entrepreneurial mindset significantly predicted entrepreneurial intentions. Thus, universities should develop entrepreneurial mindset in addition to conventional methods of promoting entrepreneurial intentions. The study made several theoretical contributions to the literature on entrepreneurship education and entrepreneurial intentions. First, the study integrated research competence and entrepreneurial mindset into existing theories to generate fresh theoretical insights. Second, the study demonstrated that research competence was a critical element of human capital and entrepreneurial cognition theories. Third, the study showed that entrepreneurial intentions could be promoted by advancing entrepreneurial culture, research competence, and entrepreneurial mindset. The study provides several practical implications in this regard. First, universities in Ghana need to nurture entrepreneurial culture to develop entrepreneurial intentions among students. The culture can be fostered through initiatives such as innovation and business hubs, incubators, and

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competitions. Second, universities need to encourage research competence through research projects on real-world entrepreneurial problems. Finally, universities need to use student-centered teaching approaches to promote entrepreneurial mindset among students.

Recommendations

This study provides several recommendations for practice and future research. First, universities need to promote entrepreneurial culture through various initiatives such as business plan competitions, student exchanges, and entrepreneurship-related events. Such events can facilitate the development of research competence and entrepreneurial mindset among students. Second, universities need to encourage and reward research competence by funding projects that address real-world entrepreneurial problems identified by students. In addition to teaching technical aspects of entrepreneurship, universities need to emphasize research-related skills such as formulating research questions, analyzing and interpreting data, and reporting research findings accurately and ethically. Third, universities need to use innovative teaching methods to promote entrepreneurial mindset. Problem-based learning and instructional methods such as case study analysis, business simulations, design thinking, and mentoring can be used. Fourth, the Ghanaian government, through the Ministry of Education and the Ghana Tertiary Education Commission, needs to formulate policies that promote entrepreneurship, research competence, and innovative study programs at universities. The government can fund commercialization of student research projects, university-industry collaborative research programs and incubators, and entrepreneurship skills development programs to promote graduate employability and economic development. Lastly, future research can adopt a mixed-methodology approach to explore the mechanisms by which entrepreneurial culture, research competence, and entrepreneurial mindset influence entrepreneurial intentions in local and international universities. The study can be replicated in public and private universities and can compare the influence of entrepreneurial intentions in local and international students. Future studies can also examine additional variables such as entrepreneurial self-efficacy, digital skills, and institutional support and consider other factors such as gender, access to funding, and institutional resources.

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