ENTREPRENEURSHIP EDUCATION IN THE DIGITAL AGE: AN EXAMINATION OF EFFECTIVE PEDAGOGIES AND TECHNOLOGY-ENABLED INSTRUCTIONAL STRATEGIES

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ABSTRACT

This study investigated the effects of technology and the different approaches to learning entrepreneurship at the University of Cape Coast (UCC) in Ghana. With a quantitative approach, data was collected from 100 respondents, including teachers, students and administrative staff, using structured questionnaires. A simple random sampling method was employed to include a variety of constituents, and the data was analysed with the Statistical Package for the Social Sciences (SPSS) into frequency and percentages. The demographic data revealed that most of the respondents were young, between 21 and 30 years of age. The study found that 65% of the respondents agreed with the statement that technology assisted in improving the quality of education, and 55% agreed that web-based learning allowed students to participate more actively. The results revealed that 60% of the participants were of the view that flipped classrooms and online courses enhance students' performance. The survey participants expressed that technology-based learning approaches enhanced their educational experience by a rate of 65%. The study recommends that educational institutions need to invest more in teacher training, facilities development and digital content development. The study concludes that technology use in teaching is essential to enhance contemporary entrepreneurial education.

Key Words*:* Technology-Enhanced Teaching, Entrepreneurship, Digital Learning, Student Learning Outcomes, Higher Education

INTRODUCTION

Entrepreneurship education is facing various challenges related to today's digital environment, primarily due to new and emerging technologies such as artificial intelligence, data analysis, interactive gaming platforms, and other online platforms (Xue, 2025). Such changes do not change the way business is done, but they do change the skills needed to operate as an entrepreneur. Digital transformation investment moved from $1.5 trillion in 2021 to a projection of $6.8 trillion in 2023, evidencing the potential of incorporating digital tools in education (Statista, 2023). Creatively, the spread of digital means across the globe allows for educators and educational organisations to develop and enhance their undergraduate and graduate-level entrepreneurship courses. According to Bae et al. (2014), digital innovation has

become an important element of entrepreneurship education, and thus, the time to replace traditional theory-based teaching with a more hands-on, experiential learning approach supported by technology. Bae et al. (2014) argue that digital innovation is now a necessity in entrepreneurship education as an alternative to traditional theory and lecture-based learning and champion a more experiential learning opportunity enabled through technology. Sitaridis and Kitsios (2024) indicated that AI, digital platforms, and gamified learning environments increase the entrepreneurial ability of students. In a similar manner, Bell and Bell (2023) illustrate ways generative AI can personalise the learning experience and encourage student thinking by encouraging learners to learn through interactive, ever-changing real-world simulation. Also, Lavonen and Villalba-Condori (2019) pointed out that utilising big data and AI through adaptive technologies tailored to relevant curriculum content would amplify the learning effectiveness of an individual. According to Chen et al. (2024), dynamic digital pedagogies facilitated the creation of engagement-driven feedback interactions which advanced learning outcomes. Zhang (2021) argued for the systemic overhaul of curricula designed using digital technologies which integrate practical applications of the theoretical knowledge taught. These changes are important for equipping learners for contemporary digital economies which depend on e-commerce, platform-based businesses, and automated customer interactions.

The African continent provides substantial opportunities for business growth, largely due to the technological revolution and rapidly stabilising youth population who are familiar with digital technologies. Financial technology, educational technology, health technology, and agricultural technology are some of the primary sectors for entrepreneurial ventures on the continent (Ahaisibwe, 2024). According to Right for Education (2024), the access to mobile technology, alongside digital payment systems and e-learning solutions, has empowered young Africans to start entrepreneurial businesses that can be scaled, despite existing infrastructural limitations. Inadequate digital infrastructure, lack of financing, and outdated curricula are a few of the systemic issues cited by Mbeteh and Pellegrini (2018) and Du Toit-Brits (2018). The International Society for Technology in Education (Selwyn, 2012) discusses a valid argument regarding professional development concerning digital teaching in Northern Africa. Furthermore, Kuratko et al. (2023) and Saebi et al. (2018) have also indicated that resistance to change by schools and current regulations render the use of technology challenging in African higher education. Hence, the skills and knowledge gap between the curriculum provided and that required by the digital entrepreneurial economy is significantly wide. The African Union's Agenda 2063 and the United Nations' Sustainable Development Goals (SDGs) advocate the importance of entrepreneurial and digital skills for inclusive economic development. Unless entrepreneurship education in Africa is transformed, it risks losing the opportunity to leverage its demographic dividend for economic transformation (Lans et al., 2014; Nabi et al., 2017).

Digital entrepreneurship education entails both opportunities and challenges in Ghana. The previous era has seen events like the Ghana Tech Summit 2023 and Ghana Digital and Innovation Week 2024 emphasising the country's progress in entrepreneurship. The 2023 Ghana Tech & Entrepreneurship Accelerator Bootcamp anticipated that skill set formation among women entrepreneurs was already in progress. But on this assumption, many Ghanaian universities are fated to be stuck in conventional pedagogical practice (Right for Education, 2024). Research done by Wibowo et al. (2023) made some assumptions about Ghana's private and informal sectors, which hold future promise; however, these traditional educational institutions fail to deliver a satisfactory digital learning experience. According to Al-Gindy et al. (2022), institutions exist merely to teach theory-based knowledge and do not cater to practical learning approaches, such as technology usage, thus allowing students to implement their learning into real-life situations. Additionally, Mbeteh and Pellegrini (2018) observed that

the same problems presented in Ghana are prevalent in many other West African countries as well, demonstrating wider issues regarding educational reform. Moreover, the digital education landscape in Ghana remains plagued by problems in funding, infrastructural support, and policy-making frameworks. It is challenging to develop interactive technological platforms like voice simulation and artificial intelligence-based websites that can transform learning experiences for students. For Sánchez-García et al. (2017), the challenge is quite serious in that it demands much larger linkages between learning processes and the fast-evolving requirements of the present digitalised economy.

This study is based on constructivist learning theory, which suggests that students actively develop their understanding through experiences, interactions, and reflections, rather than just absorbing information (Piaget, 1950; Vygotsky, 1978; Jonassen, 2010; Dooly & Sadler, 2019). The constructivist learning theory underpins digital technologies and original approaches in entrepreneurship education because of its focus on hands-on, learner-centred experiences that are based on entrepreneurial world challenges. Accordingly, the present study was focused on effective teaching strategies and technology enhanced instruction, which have appropriations for constructivism in that the learning is interactive and personalized, which is made possible through a variety of digital tools, including simulations, gamification, and adaptive learning platforms. Through these digital means, learners actively pursue critical and creative thinking, problem-solving skills, and professional skills that have transitioned from theory to practice in an increasingly digital world.

METHODOLOGY

This study used a quantitative research design to gather and analyse data on the effects of technology-enhanced teaching and instructional methods on students' learning outcomes in entrepreneurship education. The quantitative method was useful in this study because it helped researchers to measure and evaluate the study objective. The approach sought to achieve consistency, repeatability, and wider applicability of the outcomes by employing systematic data collection techniques and using statistical methods for analysis. The study was conducted at the University of Cape Coast (UCC), located in central region, Ghana. UCC was selected as the study site because of its vibrant student body and its well-developed business and technology education programmes. With these characteristics, the institution was suitable for researching the integration of digital technologies into teaching entrepreneurship. The existence of a technology-rich environment and active entrepreneurship development programmes at UCC created the context needed for the investigation of technology-orientated teaching methods. The target population included all undergraduate students undertaking UCC’s entrepreneurship courses. The focus of the study was students who participated in entrepreneurship training that incorporated the use of digital devices. This emphasis was made because these students are the ones most likely to experience and assess the instructional methods incorporating technology, thus providing useful information concerning the study objectives. As a means of ensuring representativeness of the larger sample population, a stratified random sampling method was used. This methodology is said to enhance sampling representativeness, as it is devoid of sampling bias (Etikan & Bala, 2017). The researchers were of the view that 100 students would be statistically adequate for quantitative analysis and, at the same time, practically feasible given the timeframe and resources available for the research. Data related to the study were collected through questionnaires containing only closed-ended questions. The closed-ended questionnaires were aimed at collecting specific quantitative information regarding students’ perceptions of effective teaching methods and the use of digital technologies in entrepreneurship education. The Statistical Package for the Social Sciences (SPSS) was used to analyse the data. Data were presented using frequencies and percentages in a descriptive manner to recognise patterns. This interpretive process revealed how

technology-supported pedagogical practices are effective and the influences of such practices on the learning results of students in entrepreneurship education. The advantage of SPSS was to make data analysis and interpretation a more rigorous and structured process (Pallant, 2020).

RESULTS AND DISCUSSIONS

Demographic Characteristics

The demographic information shown in Table 1 reveals a diverse and well-balanced group of 100 participants, representing various ages, educational backgrounds, institutional positions, and fields of study. This variety enhances the research by incorporating multiple viewpoints on entrepreneurship education and digital teaching strategies. In terms of age, the majority of respondents, 35%, are aged 21 to 30, while 25% fall into the 31 to 40 categories. Meanwhile, 15% of participants are younger than 20 or between 41 and 50 years old, and just 10% are over 50. The results indicate that the age group in the sample is predominantly young, suggesting that many individuals are either studying or starting their careers. This observation is consistent with research conducted by Urruticoechea et al. (2021) and Arco-Tirado et al. (2020); younger learners often adapt swiftly to online learning and display a keen interest in technology-focused education, particularly in entrepreneurship. Their engagement with tools like gamification and simulations, along with other tech-driven learning methods, is enhanced by the use of digital resources, highlighting their significance in the progress of digital education. The participants in the study come from diverse educational backgrounds. Specifically, about 30% are undergraduate students, while 25% are graduate students.

Furthermore, 20% are pursuing postgraduate degrees or doctoral studies, 15% are working on professional certifications, and 10% are participating in executive education programmes. This variety highlights that entrepreneurship education attracts learners from multiple educational levels. Recent studies emphasise the importance of modifying digital teaching methods to cater to the cognitive and experiential needs of students at different educational stages (Daspit et al., 2023). These varied academic levels influence how learners interact with materials and technology, signalling the necessity for adaptable teaching models. Within the group, the roles include 50% students, 30% educators, and 20% administrators, presenting a comprehensive perspective of the educational landscape. This combination of viewpoints yields valuable insights into how digital technologies are integrated, received, and managed in educational settings. Igbo & Zubairu. (2021) highlight that effective entrepreneurship education results from a collaborative effort among curriculum developers, educators, and administrative teams, ensuring that institutional policies align with advancements in digital technology. This balance among stakeholders adds reliability to the findings of the study and indicates that reforms in digital teaching must receive support from all levels within institutions. The fields of study represented show a variety of interests: Business Administration (30%), Entrepreneurship (25%), Innovation and Technology (25%), and Management (20%). This distribution highlights how entrepreneurship education attracts interest from many fields. Nabi et al. (2018) and Fayolle et al. (2016) said that entrepreneurship thrives at the crossroads of different disciplines. When paired with innovation and business education, this synergy cultivates essential skills such as strategic thinking and problem-solving in students. Moreover, those with a background in technology and innovation tend to gain from and promote digital learning tools, emphasising the necessity of tech-focused teaching approaches. These findings stress the need for flexible online teaching strategies that cater to the diverse needs of students from various fields and academic backgrounds. To ensure the effective incorporation and ongoing use of digital tools in entrepreneurship education, it is crucial for schools to foster collaboration among students, teachers, and school administrators.

Table 1: Demographic Information

Variable	Category	Frequency	Percent
Age	Under 20	15	15%
	21-30	35	35%
	31-40	25	25%
	41-50	15	15%
	Over 50	10	10%
	Total	**100**	**100%**
Level of Study	Undergraduate	30	30%
	Graduate	25	25%
	Postgraduate/Doctoral	20	20%
	Professional Certification	15	15%
	Executive Education	10	10%
	Total	**100**	**100%**
Role in Institution	Educator	30	30%
	Student	50	50%
	Administrator	20	20%
	Total	**100**	**100%**
Course of Study	Entrepreneurship	25	25%
	Business Administration	30	30%
	Management	20	20%
	Innovation and Technology	25	25%
	Total	**100**	**100%**

Source: Field Data (2024)

Effective Pedagogical Approaches

Analysing the results in Table 2 reveals strong indicators that digital technologies are seen as significantly improving teaching methods in entrepreneurship education. A notable 65% of participants either agreed or strongly agreed that these technologies have enhanced the quality of educational practices, which aligns with existing research on technology in learning. Sitaridis and Kitsios (2024) claim that using digital tools like AI, cloud services, and collaborative platforms has transformed teaching methods, allowing for more adaptable and student-focused approaches. Similarly, Bell and Bell (2023) suggest that generative AI applications are changing how content is delivered, enabling innovative problem-solving methods that resemble real-world entrepreneurial decisions. Moreover, Lavonen and Villalba-Condori (2019) offer evidence supporting this by showing that digital technologies, especially those using big data and AI, can customise educational content to meet individual learner needs, thus enhancing instructional value. This customisation not only improves understanding but also boosts student motivation and retention. In this context, Sánchez García et al. (2017) highlight that changes in digital education are vital for aligning entrepreneurship training with the requirements of the digital economy, ensuring that students gain the skills needed in current business environments. The findings also indicate that 55% of respondents feel that interactive digital resources, including simulations and gamified learning spaces, improve student engagement. Orel (2020) supports this view by highlighting the benefits of using virtual reality and simulation for teaching, as these methods provide students with a secure and engaging space to make business choices.

Similarly, Hudson and DeGast-Kennedy (2009) illustrated that virtual environments can mimic real entrepreneurial scenarios, creating valuable opportunities for teamwork and skill development. Zainuddin (2010) states that adding interactive elements and gamification boosts

students' emotional and mental engagement in their studies. This results in higher motivation levels and improved retention of knowledge. Younger learners, who are accustomed to digital technology, find the combination of theory and hands-on practice in a fun and dynamic way especially attractive. Furthermore, these tools cater to different learning preferences, helping to overcome some limitations of traditional lectures.

According to the education survey results, 60% of respondents either agreed or strongly agreed that methods of digital learning, such as the flipped classroom and online courses, provide avenues for improving a student's school performance. This point is well supported by the latest literature. Chen et al. (2024) found that AI systems give learners personalised learning and faster feedback and that this greatly enhances the students' comprehension and application of skills in difficult subjects. On the other hand, Zhang (2021) stated that digital resources allow the disassembling of course content, which is then reordered to develop critical thinking and self-learning skills. In contrast, Hanushek and Raymond (2002), assessing traditional and technology-based teaching methods, found that the latter are better at the development of entrepreneurship skills, specifically analytical and strategic. According to Wang (2022), blended learning – authentically compatible with online learning and face-to-face instruction – increases deep learning by allowing students to interact with content at their own pace as well as engage in instructor-provided discussions. These diverse learning environments have been found highly beneficial for entrepreneurship because it requires both book knowledge and practical application. On the composition of it, 55 per cent of respondents noted that online teaching methods have been incorporated into the teaching of entrepreneurship. While this shows advancement in the use of digital tools, the fact that 25% of responses were neutral and 20% were negative points to persistent challenges. Research shows that these difficulties often stem from a lack of organisational support, insufficient digital tools, or inadequate teacher training (Cunningham et al., 2015).

Gkrimpizi & Peristeras (2022) notes that limited funding and outdated regulations are significant barriers to the wider adoption of innovative teaching technologies, especially in underdeveloped areas. These insights underline several important aspects. First, they imply that appropriately using digital teaching tools can enhance the quality and effectiveness of entrepreneurship education. Second, they suggest that even though many educators are eager to adopt digital resources, the successful execution depends on having robust support mechanisms, like teacher training, course updates, and investment in digital technology. To conclude, a varied response actually stresses the necessity for a well-thought-out, inclusive educational innovation strategy, looking at not only the technology available but also at the pedagogical principles that govern its use. Should this be effectively carried out by educational institutions using these results, then student engagement and quality learning outcomes will be expected to improve, and graduates will be better prepared for the entrepreneurial demands of the digital age. Going the other way, if these current integration problems are ignored, then poorer quality learning and outcomes will continue in place, with a focus on resource-deficient areas.

Table 2: Effective Pedagogical Approaches

Variables	Category	Frequency	Percent
Digital technologies have improved the quality of pedagogical approaches in entrepreneurship education.	Strongly Disagree	5	5%
	Disagree	10	10%
	Neutral	20	20%
	Agree	40	40%
	Strongly Agree	25	25%
	Total	**100**	**100%**
	Strongly Disagree	10	10%
	Disagree	15	15%

Interactive digital tools (e.g., simulations, gamification) enhance student engagement in entrepreneurship courses.	Neutral	20	20%
	Agree	30	30%
	Strongly Agree	25	25%
	Total	**100**	**100%**
Digital pedagogical approaches (e.g., flipped classrooms, online modules) contribute to better learning outcomes in entrepreneurship education.	Strongly Disagree	8	8%
	Disagree	12	12%
	Neutral	20	20%
	Agree	35	35%
	Strongly Agree	25	25%
	Total	**100**	**100%**
Digital pedagogical methods are integrated into your entrepreneurship education curriculum.	Strongly Disagree	5	5%
	Disagree	15	15%
	Neutral	25	25%
	Agree	35	35%
	Strongly Agree	20	20%
	Total	**100**	**100%**

Source: Field Data (2024)

Impact of Technology-Enabled Instructional Strategies

The findings of this study indicate that technology-mediated instructional strategies are generally considered useful by all in entrepreneurship education, albeit with different intensities along various indicators. A majority of respondents (55%) considered these instructional strategies to have a positive effect on student performance, while 20% maintained a neutral position. This implies the view that many learners are reaping benefits from the presence of technology in their learning environments. The findings of the present study align with that of Chen et al. (2024), who assert that AI supports adaptive learning and real-time feedback; Zhang (2021) also points to digital tools as agents of change in teaching and learning outcomes. Digital platforms can help develop critical thinking by simulating real problems for students. However, 25% of participants noted negative effects due to issues with infrastructure, digital skills, and teaching methods. Good implementation is key to success.

In terms of how students feel about their education, 65% of those surveyed indicated that the use of tech-driven approaches enhanced their learning experiences. This finding is consistent with Kurt's (2017) research, which revealed that engaging technologies—like game-based learning systems and interactive multimedia—boost student enthusiasm and participation. In addition, Hwang and Fu (2018) assert that learning through mobile apps increases satisfaction by providing students with the ability to study in a flexible manner and at their own speed. Wang (2023) concurs with this perspective, highlighting that mixed learning formats promote immediate feedback and valuable interactions, which are vital for enhancing overall student contentment. However, 15% of respondents noted feelings of dissatisfaction, while 20% remained neutral, which could suggest issues such as a lack of personalisation, subpar user experiences, or challenges in navigating online platforms. According to Kennedy & Laurillard (2019), satisfaction is influenced not only by the existence of technology but also by how user-friendly and inclusive it is in addressing the requirements of students.

The combined instructional methods garnered a 60% positive reaction, signifying that many learners appreciate the adaptability and balance these strategies offer. A study conducted by Garrison and Vaughan in 2008 further substantiates this, demonstrating that blended learning enhances cognitive involvement and encourages more reflective, autonomous learning. According to Hernández- Sánchez et al. (2019), hybrid educational practices can help reach different learning objectives while also helping to make resources available to enhance professional development. 55% of those interviewed said technology was part of their

educational practices in order to meet all types of learners; it was a promising sign that digital tools were slowly satisfying all learners. This perspective is consistent with the findings of Lavonen & Villalba-Condori (2019), who illustrate how artificial intelligence and big data can modify content to suit individual students' cognitive styles and learning speeds. Moreover, Guo et al. (2014) showcased that using video content greatly boosts involvement and memory of information, especially for those who learn better through seeing and listening. As 25% of the participants had neutral positions and 20% held negative feelings toward their experiences, it is clear that not all learners felt supported. These experiences support Margaryan et al. (2015), who note that many digital opportunities are often poorly rooted in educational theory and thus do not respond to the needs of different learners. The implications of these findings indicate that although digital tools can promote inclusiveness, it is important to continuously evaluate the design and purpose of digital learning to ensure that it is diverse.

Table 3: Impact of Technology-Enabled Instructional Strategies

Variables	Category	Frequency	Percent
The impact of technology-enabled instructional strategies on student performance in entrepreneurship courses.	Very Negative	10	10%
	Negative	15	15%
	Neutral	20	20%
	Positive	35	35%
	Very Positive	20	20%
	Total	100	100%
Technology-enabled instructional strategies have led to improved student satisfaction in entrepreneurship education.	Very Negative	5	5%
	Negative	10	10%
	Neutral	20	20%
	Positive	40	40%
	Very Positive	25	25%
	Total	100	100%
Blended learning models (combining online and face-to-face instruction) improve student outcomes in entrepreneurship education.	Very Negative	8	8%
	Negative	12	12%
	Neutral	20	20%
	Positive	35	35%
	Very Positive	25	25%
	Total	100	100%
Technology-enabled instructional strategies support diverse learning styles and needs in entrepreneurship education.	Very Negative	7	7%
	Negative	13	13%
	Neutral	25	25%
	Positive	35	35%
	Very Positive	20	20%
	Total	100	100%

Source: Field Data (2024)

CONCLUSIONS

This study provides compelling evidence that the incorporation of technology-enhanced teaching methods substantially enhances learning outcomes in entrepreneurship education. The findings indicate that students who engage with digital instructional strategies—such as gamified learning, simulations, flipped classrooms, and blended learning—demonstrate improved engagement, satisfaction, and comprehension of entrepreneurial concepts. Results suggest that students who engage with digital tools such as games, simulations, flipped classrooms, or blended learning report increased engagement, satisfaction, and a better grasp

of entrepreneurial ideas. These technological modalities improve lesson delivery but also promote critical thinking, strategic decision-making, and independent learning, all of which are essential when developing an entrepreneurial mindset. This study concludes that incorporating technology into education significantly improves the learning experience in entrepreneurship. It is clear that most respondents recognise the potential benefits of technology, but there are barriers – infrastructure, digital skills and institutional support.

Implication of the study findings

This study indicates significant backing for incorporating digital technologies into education, with 65% of participants agreeing it improves teaching quality. In Ghana, it is crucial to bridge the digital skills gap to strengthen the entrepreneurial sector. Updating university programmes to prioritise hands-on, tech-focused learning is necessary. Collaboration among universities, the government, and the private sector is key; together, they can create innovation labs and training centres that provide students with necessary digital skills. Ultimately, it is important to connect entrepreneurship education with digital abilities to reach the UN Sustainable Development Goals and fulfil the African Union Agenda 2063. If this connection is not made, graduates' risk being ill-equipped for the rapidly evolving digital job market.

Recommendations

Base on study findings, it is recommended that educational institutions should have regular skills training and capacity building opportunities for teachers to develop the knowledge and skills necessary to use technology and digital tools for teaching entrepreneurship. In addition, institutions should improve access to digital facilities and digital tools by providing multiple digital tools to support, facilitate, and collaborate with technology integration into teaching entrepreneurship. Without the availability of infrastructure, teachers and students will have difficulty reaping the full benefits and potential of digital resources. By combining training and support through access to tools, it will improve teaching and learning and enhance the relevance of teaching and learning with real-world practices and tools of contemporary entrepreneurs.

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