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Entrepreneurship
Digital Transformation, Education,
Opportunities and Challenges

Edited by Florin Drăgan and Larisa Ivascu



Entrepreneurship - Digital Transformation, Education, Opportunities and Challenges

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Business, Management and Economics

Volume 28

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Preface

This book adopts a multidisciplinary approach to entrepreneurship. Entrepreneurial processes contribute to developing new products and services, developing innovative business models, and improving existing ones. In recent years, business models have increasingly focused on digital transformation and well-being, reflecting shifting market dynamics. The concept of intergenerational business, an emerging area of interest, also highlights the importance of studying entrepreneurial ventures within the current market context.

Entrepreneurship is also taking shape within universities, where students apply theoretical models and explore funding opportunities to develop and refine business ideas. The growing interest in entrepreneurship among young people highlights universities' vital role in this direction. Collaborations between universities and the business sector are also intensifying, leading to the development of business simulators, laboratories, and simulation rooms. University-driven initiatives such as startups and spinoffs are particularly noteworthy.

Innovation plays an essential role in business. If companies do not innovate, they risk losing their competitiveness. Digital transformation is now found in many organizations. Market conditions, marketing strategies, competitiveness, and stakeholder interests must be constantly evaluated to enhance business success. This volume includes chapters on entrepreneurship and well-being, innovation, and risk management. It aims to offer practical and theoretical solutions for entrepreneurs from diverse fields.

This book focuses on three major themes: entrepreneurship, digital transformation, and entrepreneurial education. The increased interest in entrepreneurship and digital transformation makes this volume globally relevant. Organizations and researchers are increasingly exploring innovative approaches to digital transformation, which can be strengthened through education and investments in financing, awareness, social impact, and sustainability. Research and practical tools in this field contribute to expanding knowledge and improving practices.

Key topics addressed in this volume include:

- Opportunities for young entrepreneurs
- Social responsibility in entrepreneurial activities
- Knowledge management
- Tools for digital transformation
- Artificial intelligence in entrepreneurship

- Factors shaping successful entrepreneurs and businesses
- Societal benefits of entrepreneurship in knowledge-based and sustainable development
- Future trends in entrepreneurship
- Financing and support systems for entrepreneurial initiatives
- Engineering systems for entrepreneurship

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Section 1

Entrepreneurship: Opportunities and Challenges

Chapter 1

Artificial Intelligence Adoption by Digital Startups in Decision-Making within Uncertain Business Environments

*Kambiz Talebi, Zohreh Ghasemi, Niloofar Nobari
and Masoume Seraj*

Abstract

This chapter examines the pivotal role of artificial intelligence (AI) adoption by digital startups in decision-making processes within highly uncertain business environments. It explores how AI technologies such as machine learning algorithms, natural language processing, and AI-driven decision support systems empower startups to process vast datasets, discern patterns, and make informed decisions in real-time. The chapter highlights the strategic benefits of AI, including enhanced operational efficiency, risk management, and competitive advantage, while also addressing the challenges of integrating AI, such as cost and complexity. Through an analysis of empirical research and case studies, this chapter provides valuable insights for practitioners and scholars into the transformative impact of AI on digital entrepreneurship, particularly within the context of Industry 4.0 technologies. It concludes by offering practical recommendations for startups to effectively harness AI, fostering innovation and sustainable growth in the digital age.

Keywords: artificial intelligence (AI), startups, decision-making, entrepreneurship, growth

1. Introduction

The chapter commences by recognizing the dynamic and unpredictable environment in which digital startups operate, accentuating the challenges imposed by swift technological progress and global market shifts. It delineates artificial intelligence (AI) as a critical tool for enhancing decision-making processes within these organizations. The introduction outlines the methods through which AI is assimilated by startups to navigate these complexities, highlighting the potential benefits such as enhanced operational efficiency, improved risk management, and a competitive market advantage.

The analysis then progresses to explore the various dimensions of AI's impact on startups, ranging from machine learning algorithms to natural language processing

tools, and AI-driven decision support systems. These technologies empower startups to process extensive datasets, discern patterns, and expedite informed decision-making, thus mitigating risks and seizing market opportunities effectively.

Throughout the discourse, the strategic benefits of AI are emphasized, including its role in fostering innovation, refining decision-making processes, and augmenting the competitiveness of startups. The discussion also extends to the broader implications of AI on entrepreneurship, particularly within the context of Industry 4.0 technologies like smart factories, the Internet of Things (IoT), augmented reality (AR), and blockchain.

In summary, the chapter lays the groundwork for an in-depth discussion on the role of AI in digital startups, accentuating the crucial intersection of AI technologies and entrepreneurial strategies in surmounting the uncertainties and challenges of the contemporary business landscape. It promises to provide profound insights not only for professionals and academics but also for anyone interested in the profound influence of AI on the nascent stages of business development.

2. Exploring the complexities of the business world

In today's business environment, uncertainty is a prevalent theme. This uncertainty can arise from a variety of sources including market fluctuations, the emergence of new technologies, changes in regulations, and shifts in consumer preferences. For startups, which often operate with constrained resources and encounter fierce competition, navigating this uncertain terrain can be particularly daunting. The impact of AI on decision-making has become a potent tool for startups aiming to interpret vast amounts of data. From machine learning algorithms to natural language processing tools, AI technologies enable startups to identify trends, extract valuable insights, and make informed decisions in real time. By integrating AI-driven decision support systems into their operations, startups not only minimize risks but also secure a competitive advantage in the marketplace.

3. AI as a catalyst in digital entrepreneurship

Artificial Intelligence (AI) is an essential component in the domain of digital entrepreneurship, particularly for startups. Numerous studies have highlighted the significance and benefits of AI in the context of new venture creation and digital entrepreneurship. AI technology has proven to offer strategic advantages by supporting and propelling business models for both nascent and established organizations. Startups that incorporate AI technologies, characterized by their small size, adoption of AI, digital transformation, and utilization of big data systems, enhance their competitiveness through these distinctive features. The scholarly literature underscores AI's role in improving decision-making processes for startup investments, signaling a shift toward employing advanced, data-centric methods to amplify predictions of startup performance.

Furthermore, AI acts as a facilitator for entrepreneurs, especially within Industry 4.0 paradigms like smart factories, the Internet of Things (IoT), augmented reality (AR), and blockchain. AI startups focus on delivering sophisticated AI technology to business clients, fostering further exploration into entrepreneurship regarding the management of technical complexity. The transformative impact of AI on

entrepreneurship has kindled a growing interest in artificial intelligence among entrepreneurs, leading to its widespread integration into digital entrepreneurship.

Additionally, AI tools are indispensable for the effective evaluation of startups, ensuring their establishment and success in the market. The role of AI in promoting sustainable social development in the service sector through startups is recognized, highlighting the potential for AI startups to drive innovation in this domain. AI technologies introduce specific challenges and opportunities related to their deployment, utilization, and value extraction, emphasizing the complexities associated with scaling AI startups.

In conclusion, AI significantly shapes the landscape of startups in digital entrepreneurship, offering strategic advantages, enhancing competitiveness, refining decision-making processes, and fostering innovation across various sectors. Understanding the implications and applications of AI in startups is crucial for harnessing its potential to promote entrepreneurial success in the digital age.

Here is the revised section, using more formal academic language.

4. Startups and artificial intelligence

Artificial Intelligence (AI) is an indispensable component within the sphere of digital entrepreneurship, particularly salient for startups. Scholarly research has consistently highlighted the significant advantages and pivotal role of AI in fostering new venture creation and propelling digital entrepreneurship forward. Empirical evidence suggests that AI confers strategic benefits by enhancing, supporting, and advancing business models, relevant to both burgeoning and well-established enterprises. Startups that prioritize AI technologies—distinguished by their modest scale, embracement of AI, commitment to digital transformation, and engagement with big data systems—substantially bolster their competitive edge through these unique attributes [1]. Academic discourse emphasizes AI's enhancement of decision-making processes in startup investments, signaling a trend toward adopting sophisticated, data-driven methodologies to improve forecasts of startup performance [2].

Additionally, AI acts as a catalyst for entrepreneurs, especially pertinent within Industry 4.0 paradigms such as smart factories, the Internet of Things (IoT), augmented reality (AR), and blockchain technologies [3]. Startups focused on AI are committed to delivering advanced AI solutions to their business clientele, which necessitates ongoing investigation into entrepreneurial management of technical complexities. The transformative influence of AI on the entrepreneurial landscape has ignited a burgeoning interest in AI among entrepreneurs, culminating in its widespread adoption in digital entrepreneurship.

Additionally, AI tools are vital for the proficient evaluation of startups, ensuring their successful establishment and sustainability in the marketplace [4]. The role of AI in fostering sustainable social development within the service sector through startups is well-recognized, highlighting the capacity of AI-driven startups to spearhead innovation in this area [5]. Challenges and opportunities arising from the deployment, utilization, and value extraction of AI technologies are also noted, illustrating the complexities involved in scaling AI startups.

In summary, AI profoundly shapes the landscape of startups within digital entrepreneurship, offering strategic advantages, boosting competitiveness, refining decision-making processes, and fostering innovation across diverse sectors. A deep understanding of AI's implications and applications in startup contexts is essential for leveraging its potential to promote entrepreneurial success in an increasingly digital age.

5. AI adoption in the decision-making process of startup ventures

According to Agrawal et al. [6], AI can profoundly impact labor markets by either automating decisions or enhancing human decision-making capabilities. This distinction is crucial for comprehending how AI's adoption in startup ventures may influence decision-making processes, highlighting AI's potential to either substitute or augment human decision-makers.

The deployment of cost-sensitive machine learning models in evaluating the potential success of Israeli startups has markedly reduced risk for venture capital funds and startup investors compared to traditional assessment models. This innovative approach facilitates the creation of tailored risk profiles, aligning them with the specific risk appetites of investors. The research underscores AI's significant utility in startup investing, presenting it as an essential tool for investors navigating this sector effectively [2].

Additionally, the integration of AI in decision-making processes enables startups to leverage sophisticated algorithms and predictive analytics to optimize outcomes, anticipate market trends, and uncover new opportunities. By harnessing AI, startups can swiftly adapt to changing market conditions, secure a competitive advantage in their industries, and drive sustainable growth. The strategic implementation of AI in decision-making processes not only enhances the competitiveness of startup ventures but also cultivates a culture of innovation and adaptability, positioning these enterprises for long-term success in a competitive business environment [7].

6. AI and exceptional opportunities for digital startups

Analytical research on artificial intelligence (AI) has illuminated its transformative potential within the realm of digital entrepreneurship, reshaping the entrepreneurial landscape profoundly. Ghezzi [8] investigates how digital startups integrate Lean Startup approaches, detailing the benefits and limitations of such methodologies. This research emphasizes the critical need to understand the synergy between Lean Startup methods and other entrepreneurial tools to effectively launch and grow ventures. Similarly, Shepherd and Gruber [9] seek to bridge the theoretical and practical divides by enhancing the Lean Startup Framework with empirical findings, thereby paving new pathways for research that could enrich both academic and practical domains in entrepreneurship.

Upadhyay et al. explore the receptiveness toward artificial intelligence within digital entrepreneurship, proposing a theoretical framework that elucidates the factors driving entrepreneurs' intentions to adopt AI. This study accentuates the importance of performance expectancy, openness, social influence, and other precursors in molding entrepreneurs' attitudes toward AI integration. Wu et al. examine how identifying social entrepreneurial opportunities can bolster the growth of commercial startups, focusing on the pivotal roles of resource orchestration and social networks in enhancing business performance. These investigations highlight the necessity of recognizing and capitalizing on opportunities within the digital entrepreneurship ecosystem.

Mashat [10] delves into the impact of AI on advanced entrepreneurship among small businesses and startups, noting how AI facilitates the processing of extensive datasets and execution of tasks traditionally requiring human intellect. This research underlines the significance of technological advancements in supporting

entrepreneurship and propelling economic growth by opening new opportunities for startups. Weber et al. analyze AI startup business models, identifying distinctive characteristics and features that set these enterprises apart in the digital arena. Through scrutinizing the unique aspects of AI startups, this study offers invaluable insights into the evolving dynamics of entrepreneurship in the AI era.

Jia and Stan [7] investigate how AI applications enhance the growth of startups, augmenting the existing literature on digital entrepreneurship. By examining the interplay between AI technologies and startup development, this research provides critical insights into the mechanisms through which AI can propel the success of emerging businesses. Additionally, Berg et al. delve into the role of data analytics in startups, emphasizing the challenges and obstacles these companies face in harnessing data to generate value. This examination underscores the crucial role of data analytics in boosting the competitiveness and sustainability of startups in today's digital economy.

In conclusion, contemporary studies on AI reveal its profound potential to redefine digital entrepreneurship. By dissecting the implementation of Lean Startup Approaches, the embracing of AI, and the strategic use of data analytics, these scholarly contributions offer a holistic understanding of how startups can leverage technology to foster innovation, growth, and success in the digital era.

7. AI and improvement of the growth of startups

The adoption of Artificial Intelligence (AI) has demonstrated a significant correlation with the growth and performance of startups in the digital era. Research by McElheran reveals that startups characterized by high-growth entrepreneurship traits, such as venture capital funding, recent innovation, and growth-oriented strategies, are more inclined to integrate AI technologies. This association suggests that the strategic deployment of AI can catalyze accelerated growth and success within the digital landscape.

Additionally, Giuggioli and Pellegrini, [3]; Rojas and Tuomi, [5] explore how the adoption of AI contributes to substantial advancements across global firms, enhancing profitability, productivity, and digital innovation, while concurrently reducing risk and augmenting customer loyalty. This highlights the transformative impact of AI on startups, enabling them to achieve elevated levels of profitability, operational efficiency, and innovation, thereby bolstering their growth and performance in the digital era.

Additionally, Hwang and Kim investigate the adoption of emerging technologies, including AI, in Korean manufacturing SMEs, revealing a notable increase in productivity among enterprises that have embraced technologies such as AI, Big Data, and Robotics. These outcomes highlight the significant improvements in productivity linked to the integration of emerging technologies, emphasizing the positive correlation between AI adoption and enhanced technical efficiency, which is crucial for startups aiming to scale and thrive in the digital age.

In summary, the integration of AI technologies markedly influences the growth and performance of startups by fostering innovation, enhancing productivity, and equipping firms to effectively navigate the complexities of the digital landscape. By adopting AI solutions, startups can position themselves for sustainable growth, competitive advantage, and success in an increasingly digital and AI-driven business environment.

8. Digital entrepreneurship activities in eastern and Western European countries

To effectively compare digital entrepreneurship activities between Eastern and Western European countries, it is imperative to consider factors such as entrepreneurial orientation, innovation, and the impact of external influences on venture performance. Research by Giuggioli and Pellegrini, [3]; Rojas and Tuomi, [5] illuminate the critical role of passion and entrepreneurial orientation in driving the performance of new ventures. These studies emphasize the importance of channeling passion toward challenging business goals and demonstrate how ventures with a strong entrepreneurial orientation can achieve superior performance by actively engaging in legitimization efforts to meet stakeholder expectations.

Additionally, Barrachina identifies key entrepreneurial hotspots in Europe, including Estonia, Sweden, Latvia, and the Netherlands, highlighting the diverse range of entrepreneurial activities across these countries and providing insights into varying levels of entrepreneurial vibrancy in different regions. Understanding these regional differences offers valuable perspectives on the unique characteristics of digital entrepreneurship in Eastern and Western Europe.

Furthermore, Research by Giuggioli and Pellegrini, [3]; Rojas and Tuomi, [5] focus on new venture entrepreneurship in East Asia, shedding light on the importance of contextual factors in shaping entrepreneurial activities. Although this study is centered on East Asia, its findings can be extrapolated to understand how regional contexts influence entrepreneurial endeavors in Europe. By considering the cultural, economic, and regulatory differences between Eastern and Western European countries, a deeper understanding of the factors driving digital entrepreneurship in these regions can be achieved.

Additionally, research by Giuggioli and Pellegrini, [3]; Rojas and Tuomi, [5] examines the impact of digitalization on social entrepreneurship development in Europe, offering insights into how technological advancements shape entrepreneurial activities. This analysis provides a framework for understanding the evolving landscape of entrepreneurship in European countries, enabling a comparison of digital entrepreneurship activities between Eastern and Western Europe.

In conclusion, by exploring the role of passion, entrepreneurial orientation, regional hotspots, and the influence of digitalization on entrepreneurship, a comparative analysis of digital entrepreneurship activities in Eastern and Western European countries can be conducted. Understanding the distinctive characteristics and drivers of entrepreneurial activities in these regions offers valuable insights for policymakers, researchers, and entrepreneurs aiming to navigate the dynamic landscape of digital entrepreneurship in Europe.

9. Governmental and nongovernmental factors influencing artificial intelligence in digital entrepreneurship

Research across various domains has underscored the significance of both governmental and nongovernmental factors in shaping the success and growth of startups in the contemporary digital era. Giuggioli and Pellegrini, [3]; Rojas and Tuomi, [5] highlight the advantages of affiliations in reinforcing a new venture's legitimacy, providing essential mentoring, access to resources, and ongoing monitoring, which are pivotal for early-stage companies. Ghezzi and Cavallo examine the impact of agile business

model innovation, particularly through Lean Startup Approaches, on the adaptability and performance of digital startups, suggesting that flexible and responsive business strategies are increasingly crucial in a rapidly evolving market.

Lee [1] focuses on the role of AI technology in augmenting the competitiveness of startups within the digital landscape, noting that technological advancements are key drivers of market differentiation. Similarly, Giuggioli and Pellegrini, [3]; Rojas and Tuomi, [5] analyze the long-term effects of digital innovations, such as the adoption of SWIFT systems, on banking performance, emphasizing the critical role of robust technological infrastructure in enhancing operational efficiency and performance.

Olaye and Seixas address the integration challenges and barriers associated with implementing AI and digital health technologies in clinical practices, stressing the necessity for institutional support and collaborative efforts to ensure successful adoption. Giuggioli and Pellegrini, [3]; Rojas and Tuomi, [5] discuss the indispensable role of venture capital investment in fostering the sustainable growth and performance of startups, underscoring the importance of external financial support and expert guidance in propelling startup success.

In the broader context of digital entrepreneurship, the integration of AI substructures is instrumental in forming innovative business ventures. Giuggioli and Pellegrini, [3]; Rojas and Tuomi, [5] assert that digital enterprises employ AI and other novel digital technologies to transform their operations, develop unique business models, enhance business intelligence, and engage effectively with customers and stakeholders. This integration not only improves operational efficiency but also cultivates a culture of continuous innovation, leading to greater job creation and economic growth.

The transition toward digital entrepreneurship involves embracing a variety of innovations and practices suited to the digital age, as detailed by Bejinaru. This includes leveraging innovative market prospecting techniques, devising creative product development strategies, and seizing collaborative opportunities with digital platforms. The development of AI substructures is fundamental to the evolution of entrepreneurial strategies in the digital domain. By adopting AI technologies, entrepreneurs can streamline operations, tap into new revenue streams, foster collaborations, and expand their market presence. Thus, the integration of AI in digital entrepreneurship not only boosts efficiency but also unlocks new avenues for entrepreneurial activity, creating a dynamic environment where technological advancements propel business growth and sustainability.

This comprehensive analysis indicates that both governmental and nongovernmental factors play critical roles in enabling and shaping the landscape of digital entrepreneurship, with AI acting as a cornerstone technology that drives innovation and business success in the digital economy.

Here is a detailed scientific conclusion and set of practical recommendations based on the content of your document, which covers the integration of artificial intelligence (AI) by digital startups.

10. Scientific conclusions

1. *AI as a strategic enabler:* The adoption of AI within digital startups significantly enhances decision-making processes, operational efficiency, and competitive positioning. AI technologies such as machine learning algorithms and natural language processing tools enable startups to process large datasets, identify

market trends, and make informed decisions rapidly, reducing risks and seizing market opportunities.

2. *Transformational impact:* AI has a profound transformative impact on startups by fostering innovation, enhancing productivity, and facilitating the management of complex business operations. The integration of AI not only aids in developing new business models but also in redefining existing ones, making startups more agile and adaptable to changing market conditions.
3. *Sectoral influence:* The influence of AI spans across various sectors including healthcare, finance, manufacturing, and services, where it plays a critical role in driving innovation and operational efficiencies. AI's capabilities in data analytics and automation provide startups the tools to overcome traditional barriers to entry and scale at an accelerated pace.
4. *Barrier and challenges:* Despite its benefits, the adoption of AI presents challenges such as high initial costs, complexity of integration, and the need for specialized talent. The landscape also includes regulatory challenges that vary significantly across different geographical regions, affecting how startups can leverage AI technologies. Also, ethical issues like privacy protection and algorithmic biases are challenges, which startups must find ways to address.

11. Practical recommendations

1. *Fostering AI literacy and skills:* To maximize the benefits of AI, startups should invest in AI literacy and skills development across their teams. This involves not only hiring AI specialists but also providing ongoing education and training to existing staff to ensure they are capable of leveraging AI tools effectively.
2. *Collaborative ecosystem:* Startups should seek to create and participate in collaborative ecosystems that include academic institutions, industry leaders, and technology providers. These partnerships can provide access to cutting-edge AI research, advanced technologies, and new market opportunities. Also, the principles of open science can be effective in this field that may lead to faster, lower-cost innovation.
3. *Adaptive regulatory frameworks:* Policymakers should consider developing adaptive AI governance frameworks that encourage innovation while protecting public interests. This includes creating standards for data usage, privacy, and security that are aligned with international best practices to foster a trustworthy environment for AI adoption.
4. *Innovation in AI application:* Startups should prioritize innovation in the application of AI, moving beyond traditional uses to explore how AI can solve complex societal challenges. This includes healthcare diagnostics, environmental monitoring, and enhancing public services through smarter infrastructure.
5. *Access to venture capital and funding:* Given the significant resource requirements for effective AI integration, startups should actively seek venture capital

and funding opportunities that are targeted toward AI-driven businesses. This involves not only securing financial resources but also ensuring access to mentorship and strategic advice from experienced investors in the AI space.

6. Robust data management strategies: To effectively leverage AI, startups must implement robust data management strategies that ensure the quality, accessibility, and security of the data used to train AI models. This includes establishing strong data governance practices to maintain data integrity and compliance with relevant data protection regulations.

By adhering to these recommendations, startups can better navigate the complexities of AI integration and maximize the transformative potential of AI technologies to drive business success and innovation in the digital era.

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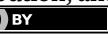
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Chapter 2

Mapping Entrepreneurial Competences for the Cultural and Creative Industries: An Application of the European Entrepreneurship Competence Framework to Course Design

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Abstract

Entrepreneurial education for the Cultural and Creative Industries (CCIs) has gained visibility in educational settings, notably higher education institutions, fostering a business-driven approach to creativity and value in cultural and artistic production. At the core of this approach lies the development of an entrepreneurial mindset, a principle underscored by the European Entrepreneurship Competence Framework (EntreComp). This framework serves as the European benchmark for initiatives promoting entrepreneurial learning, such as the project 'Fostering Entrepreneurship and Innovation in Cultural and Creative Industries through Interdisciplinary Education' (FENICE), developed under the Erasmus+ Program of the European Union. Drawing on the insights gained from the FENICE project, this conceptual work outlines the application of EntreComp in designing a teaching program aimed at bridging existing skill gaps in entrepreneurship within the CCIs, cultivating an entrepreneurial mindset, and promoting key competencies outlined in EntreComp. This chapter underscores the importance of aligning educational initiatives with EntreComp to equip students with managerial capabilities and foster entrepreneurial skills, tailoring the curricula with entrepreneurial learning outcomes that align with the unique context of the cultural and creative sector. Nevertheless, limitations are to be acknowledged, including the absence of empirical data to evaluate the actual progression of entrepreneurial competencies among students and the necessity for nurturing an entrepreneurial culture and refining educational frameworks within the CCIs.

Keywords: entrepreneurship education, learning outcomes, course design, European Entrepreneurship Competence Framework, cultural and creative industries

1. Introduction

Entrepreneurial education is deemed by many experts to significantly improve the entrepreneurial environment of most economies [1]. This perspective aligns with human capital theory (e.g., see Ref. [2]), which suggests that increased productivity can be achieved through educational attainment, knowledge, experience, and skills training. Furthermore, the growing interest in entrepreneurial education is driven by the recognition that entrepreneurship plays a crucial role in economic growth and employment. Studies have indicated that entrepreneurship education can significantly contribute to developing more, and more capable, entrepreneurs [3, 4].

The Cultural and Creative Industries (CCIs) encompass the production and/or distribution of goods or services with attributes connected to cultural expressions usually protected by intellectual property rights. Those industries comprise, as per the Green Paper on the Potential of CCIs of the European Commission [5] and refer in particular to performing arts; visual arts; cultural heritage; film, DVD and video; television and radio; video games; new media; music; books and press; architecture; and design (including graphic design, fashion design, and advertising). The vast majority (96%) of cultural and creative businesses are micro-enterprises, employing less than 10 employees. Additionally, much of the work in this sector is project-based, leading cultural and creative organizations to frequently collaborate with freelance workers in temporary arrangements [6].

CCIs are content, knowledge-intensive, and technology-driven enterprises, making them inherently suited for interdisciplinary research and education. Despite the higher education and skill levels of cultural and creative workers compared to the average workforce, the sector still faces significant skills gaps, particularly in entrepreneurship [6]. By developing their entrepreneurial and managerial abilities, students and graduates can infuse the CCIs with innovative smart, creative, and self-sufficient individuals capable of guiding and sustaining the creative economy. Thus, it is crucial to focus on cultivating these skills to ensure the CCIs are endowed with professionals who can drive innovation and maintain the sustainable operation of the global creative economy.

The purpose of this chapter is to explore the potential of applying the European Entrepreneurship Competence Framework (EntreComp) to design teaching programs tailored for the CCIs, that encourage the development of an entrepreneurial mindset. Introduced in 2016 as part of the “New Skills Agenda for Europe: Working Together to Strengthen Human Capital Employability and Competitiveness” initiative by the European Commission, the EntreComp framework seeks to establish a shared understanding of entrepreneurship competence that comprises knowledge, skills, and attitudes essential for individuals to nurture an entrepreneurial mindset and culture, thereby resulting in both individual and societal benefits.

The application of the EntreComp framework to a teaching program developed within the scope of an Erasmus+ Project, entitled “Fostering Entrepreneurship and Innovation in Cultural and Creative Industries through Interdisciplinary Education” (FENICE), is herein outlined. FENICE is a collaborative initiative involving academic and research institutions in five program countries (Bulgaria, Romania, Portugal, Greece, and Serbia) aimed at facilitating research and defining best practices to address the management and entrepreneurship needs of the CCIs. The project endeavors to align educational offerings with the evolving skill requirements of the creative economy, emphasizing innovation and sustainability. Through this consortium, diverse specialists bring together their expertise to promote collaboration,

exchange knowledge, and develop best practices that enhance the quality and relevance of business education for the CCIs, thereby stimulating their innovative potential and social impact.

The development of interdisciplinary entrepreneurship provides opportunities to engage students in more contemporary educational practices, thus creating the success factors needed for personal fulfillment, active citizenship, social cohesion, creativity, business, financial modeling, employability, and competitiveness. However, there is a lack of education, teaching, and strategies to promote entrepreneurial culture among students at the school level [7]. There is evidence in the literature about exploring how entrepreneurial culture can be nurtured and developed using an interdisciplinary and holistic approach [7].

The development of interdisciplinary entrepreneurship education presents a promising opportunity to involve students in modern educational approaches, fostering opportunities for personal fulfillment, active citizenship, social cohesion, creativity, business knowledge, financial literacy, employability, and competitiveness. Nonetheless, more educational frameworks, pedagogical methods, and interdisciplinary and holistic approaches aimed at cultivating and nurturing an entrepreneurial culture among students at the school level could still be developed.

The goal of this chapter has been to discuss the benefits and share best practices in relation to the design of teaching programs for the CCIs, with a focus on the most relevant entrepreneurial competencies. It explores curricular and pedagogic dimensions in the course design, including the relevance of the learning outcomes and the adequacy of the assessment methods selected to attain entrepreneurial learning outcomes.

2. Theoretical background

2.1 Entrepreneurship education

Sense of initiative and entrepreneurship stand out as the essential competencies among the eight crucial areas aimed at fostering lifelong learning, enhancing employability, and securing success within a knowledge-driven society [8]. According to the OECD [9], entrepreneurship is defined as the capacity to use existing resources to exploit new or alternative opportunities. It commonly refers to the establishment of new small-scale enterprises or embodies a distinct business mindset characterized by risk-taking and innovation promotion. Recognizing its indispensable role in driving economic growth, the OECD underscores the multifaceted nature of entrepreneurship [6, 9]. Similarly, as per the European Commission [10], entrepreneurship involves identifying opportunities and ideas and translating them into value for others, spanning financial, cultural, and social dimensions.

The EU has been proactively endorsing entrepreneurship initiatives, recognizing it as a vital competence within the European framework. Entrepreneurship not only enhances employability levels but also stimulates competitiveness and drives economic growth. The European Commission demonstrates a strong dedication to promoting and supporting entrepreneurship education through various means. This commitment is evidenced by funding European projects aimed at establishing reference models for future replication, issuing calls for proposals, actively advocating for good practices and experiences at the European level, organizing workshops for policymakers and practitioners, facilitating networking opportunities for policymakers

and other stakeholders, disseminating extensive information and guidelines derived from existing good practices across Europe, and conducting studies, collecting indicators, and releasing data relevant to this field.

Competence may be defined as the ability to proficiently apply learning outcomes, knowledge, skills, and personal, social, and/or methodological abilities across various contexts, including education, work, and personal or professional development. Therefore, competence extends beyond cognitive aspects, such as knowledge, to include functional components like technical abilities, interpersonal components such as social or organizational skills, and ethical principles [11]. Entrepreneurship competencies can be explored in various fields and domains, and are central to educational settings, spanning formal education systems like schools, universities, and educational centers, as well as nonformal education contexts, including youth and adult learning organizations and lifelong learning activities. Beyond education and training contexts, these competencies find application in diverse settings. For instance, individuals working in policy advocacy, supporting start-ups and entrepreneurs, or engaged in recruiting and managing human resources can all make use of entrepreneurship competencies to be successful in their respective domains [12].

Entrepreneurship competence is both an individual and collective capacity, finding application across diverse scenarios ranging from school curricula to workplace innovation, community initiatives, and practical learning experiences at universities. Tajpour et al. [13] explored the impact of knowledge management components on the sustainability of technology-driven businesses, with social media serving as a mediating variable in emerging markets. This studies underscore the importance of integrating knowledge management components across all managerial dimensions for technology-driven companies to thrive in a sustainable environment, thereby creating value and fostering sustainable competitive advantages in today's dynamic business landscape. Furthermore, if effective participation in organizational social networks is developed, it can stimulate knowledge management and facilitate value creation.

Entrepreneurial competencies are perceived as a wide range of characteristics, including personality traits and specific knowledge and skills essential for a successful entrepreneurial venture [14]. A comprehensive range of competencies such as creativity, autonomy or personal control, motivation, self-confidence, initiative spirit, perseverance, time management, and task organization, management of uncertainty and risk, problem-solving and decision-making, opportunities assessment, critical capacity, market orientation, leadership, the capacity for teamwork, communication, or networking are identified as particularly relevant in educating for entrepreneurship [15, 16]. Recognizing the importance of entrepreneurial competencies, they should be cultivated and acknowledged as a vital component of lifelong learning, progressively nurtured at all levels of education [10].

The CCIs represent a dynamic and rapidly evolving sector that significantly contributes to economic growth and employment worldwide. These industries, encompassing a wide array of activities from arts and heritage to media and design, are characterized by their reliance on creativity, cultural value, and intellectual property [5]. The cultural and creative sectors are recognized for their innovative capacity as they significantly contribute to various aspects of societal well-being and cohesion. They play a crucial role in enhancing both urban and rural areas, fostering the development of diverse products and services, enriching individuals' visual experiences, and providing content for meaningful debates [17]. With an annual revenue of €509 billion, the CCIs make up 5.3% of the EU's total GDP. Furthermore, they provide employment opportunities for 12 million people on a full-time basis,

constituting 7.5% of the EU's workforce and ranking as the third-largest employer sector in the EU [17].

Entrepreneurship education plays a pivotal role in the CCIs by equipping creative students and professionals with the necessary skills to transform their ideas into viable business ventures, as it helps them to better understand and tackle the complexities of the market. The CCIs often involve nontraditional business models and revenue streams, such as royalties, licensing, and crowdfunding [18, 19]. Creative entrepreneurs in the CCIs are driven by intrinsic motivation and seek out new opportunities. They play a crucial role in economic development but face challenges in balancing business economics with cultural and creative values, the reason why entrepreneurship education is key in equipping creative entrepreneurs with the knowledge, skills, and attitudes necessary to navigate the complexities of the creative market and successfully monetize their cultural and artistic creations. A solid foundation in entrepreneurship may allow creatives to monetize their work effectively while protecting their intellectual property rights [20].

2.2 EntreComp: The Entrepreneurship Competence Framework

In 2013, the European Commission adopted the Entrepreneurship 2020 Action Plan, presenting a renewed vision and a series of actions to be implemented at both the EU and Member State levels to bolster entrepreneurship across Europe. The plan is structured around three pillars: developing entrepreneurial education and training, creating the right business environment and role models, and reaching out to specific groups. Furthering these efforts, in 2016, the Commission launched the European Entrepreneurship Competence Framework (EntreComp) as part of the New Skills Agenda for Europe. This framework aims to support and inspire initiatives to enhance the entrepreneurial capacity of European citizens and organizations by fostering a common understanding of the knowledge, skills, and attitudes necessary for entrepreneurship.

EntreComp is a free, flexible reference framework designed to support the development and understanding of entrepreneurial competence across various sectors. Since its launch in 2016, the EntreComp framework has aimed to promote innovation, employability, and learning through entrepreneurial mindset thinking and action. The European Pillar of Social Rights emphasizes the importance of lifelong learning for ensuring equal opportunities, access to the labor market, and social inclusion [10].

The EntreComp defines entrepreneurship as “the capacity to act upon opportunities and ideas and transform them into value for others. The value that is created can be financial, cultural or social” [10]. This framework comprises 15 entrepreneurship competencies that form the foundation of an entrepreneurial mindset. These competencies are grouped into three areas: Ideas & Opportunities, Resources, and Into Action. Each area contains five competencies, which are further elaborated into thematic threads and learning outcomes. The learning outcomes are mapped across eight progression levels: Discover and Explore (foundation levels, where entrepreneurs rely on support from others), Experiment and Dare (intermediate levels, where they build independence), Improve and Reinforce (advanced levels, where they take responsibility), and Expand and Transform (expert levels, where they drive transformation, innovation, and growth). The development of the EntreComp framework involved a mixed-methods approach, including a review of academic and gray literature, case study analysis, and iterative stakeholder consultation [10].

In this context, the EntreComp framework serves as a valuable tool for developing entrepreneurial skills and competencies, facilitating updates in teaching approaches and methodologies. For example, a study by Armuña et al. [21] used EntreComp to explore the relationship between entrepreneurship competencies and entrepreneurial intention, particularly focusing on gender differences. They found that women are less likely than men to express an interest in starting their own business, with a perceived lack of ability being a more significant barrier for women than for men. Additionally, Bhatti et al. [22] suggested methods for creating entrepreneurial education and training programs that enhance psychological traits and emotional intelligence, illustrating practical applications of the EntreComp conceptual paradigm. Supported by desk analysis and interviews, Dinning [23] applied the EntreComp framework to investigate how curricula can support the development of competencies desired by enterprises. Rayna and Striukova [24] used EntreComp as one of the frameworks in their qualitative research to identify the entrepreneurial and digital skills that fab labs and maker spaces foster in the twenty-first century. These studies demonstrate the versatility and impact of the EntreComp framework in various educational and professional contexts.

3. Methods

This conceptual work outlines the application of the EntreComp in designing a teaching program aimed at fostering entrepreneurship and innovation within the CCIs aimed both at higher education students and adult learners, developed within the scope of the Erasmus+ Program of the European Union entitled ‘Fostering Entrepreneurship and Innovation in Cultural and Creative Industries through Interdisciplinary Education’ (FENICE). Fostered by the European Union, this academic initiative aims to enhance the quality and relevance of business and art education for the CCIs in five countries (Bulgaria, Romania, Portugal, Greece, and Serbia), aiming for the following objectives: (i) to support research and best practices exchange in management and entrepreneurship for the CCIs; (ii) to adapt education to the creative economy’s skills needs, innovation, and sustainability value; and (iii) to model university-driven solutions to promote incubation, start-ups, and entrepreneurship in CCIs, including career counseling/professional pathways for traditional and nontraditional students.

The designed teaching program, conceived in the context of the FENICE projects, primarily targets students and professionals with arts and humanities (A&H) and/or economics and business studies (B&E) backgrounds. With an interdisciplinary base, this course combines the theory and practice of entrepreneurship and management as platforms for leveraging self-employment and acquiring and/or improving skills, abilities, and knowledge. By strengthening these areas, learners will be even more prepared to take on new sustainable personal and/or professional challenges within the context of the CCIs.

The EntreComp framework comprises three competence areas: Ideas & Opportunities, Resources, and Into Action, each comprising five competencies. The EntreComp competencies were meticulously mapped to specific learning outcomes relevant to the CCI context. This involved aligning each of the 15 competencies with targeted skills and knowledge areas essential for entrepreneurship and innovation in these industries. This stage was carried out in collaboration with instructors and students who participated in the program, along with consultations with stakeholders

from the CCIs. Using EntreComp as a foundational guide, the curriculum was structured to include modules and activities that promote the development of each competence. This chapter uses EntreComp's comprehensive approach to entrepreneurship education to ensure that the program addresses the diverse skill sets required for entrepreneurial success in the CCIs.

4. The application of EntreComp to the FENICE project: A course design proposal for the CCIs

4.1 Course overview

The course developed within the FENICE project has a theoretical and practical foundation in management and entrepreneurship in the CCIs. The inherent interdisciplinarity in these areas allows for the integration of experiential learning activities and teaching approaches at various stages of the course, facilitating the development of skills, competencies, and knowledge. Consequently, individuals completing this course will gain a deeper understanding and practical insight into combining the creation, production, and distribution of products and services characteristic of the CCIs, which often possess qualities that are difficult to measure and are frequently subject to intellectual property rights and duties.

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The course content is designed for both students (BA and MA levels) and professionals, including adult learners or graduates from vocational or higher education. Students have a workload of 60 hours, equating to 2–3 ECTS credits, while professionals have a 30-hour workload. The course is divided into two central thematic units: Unit 1—Understanding Entrepreneurship in the CCIs and Unit 2—Entrepreneurial Practice: Modeling a CCI Enterprise. This structure allows specific objectives and learning outcomes to be tailored to the target audience of each area. Additionally, the generic nature of the course content enables activities to be structured for on-site, hybrid, blended, and online formats. This flexibility supports initiatives that explore both the individuality and the collective experience of the participants.

4.2 FENICE's entrepreneurship education outcomes

Learning outcomes can be defined as statements that define what a learner knows, understands, and can do upon completing a learning process, expressed in terms of knowledge, skills, and competence. These outcomes are used in qualifications frameworks, standards, and curricula to articulate educational intentions and goals. Importantly, they represent desired targets rather than actual outcomes of learning. Learning outcomes are always learner-centered, focusing on what the learner is expected to know, be capable of doing, and understand. Learning outcomes help clarify educational intentions and serve as benchmarks for demonstrating actual learning achievements [11].

Considering the scope of the FENICE project and its interdisciplinary approach, students and trainees are expected to acquire a core group of skills and attitudes, including:

- Understanding the key characteristics of the economy of the CCIs;
- Designing business models for CCIs, encompassing strategic business planning, innovative methods for fund generation, stakeholder management, and partnership development;
- Identifying new business opportunities for CCIs with a focus on long-term financial sustainability; and
- Working effectively in interdisciplinary cultural and creative teams.

The thematic Unit 1—Understanding Entrepreneurship in the CCIs, aims to help students understand the core concepts related to the CCIs, as well as their potential for connectivity and innovation, particularly social innovation. This unit focuses on conceptual and policy-related program content. Specific learning outcomes for Unit 1 include:

- Positioning the cultural and creative sector within the broader society and economy;
- Differentiating and selecting various types of CCI projects and work teams;
- Recognizing and addressing ethics and intellectual property issues;
- Understanding the economic implications of cultural policies;
- Identifying key stakeholders related to cultural policies;
- Recognizing the importance of new digital techniques and technologies for the CCIs;
- Promoting CCI activities, products, and projects.

The thematic Unit 2—Entrepreneurial Practice: Modeling a CCI Enterprise, aims to provide students with an understanding of the specificities of business ventures within the CCIs, emphasizing cooperation, co-creation, and interdisciplinarity. Business planning serves as a crucial pedagogical tool, with program content directed at guiding students through the various steps of developing a business plan. Specific learning outcomes for Unit 2 include:

- Generating and/or identifying business ideas within the CCIs;
- Devising viable solutions to encountered problems;
- Distinguishing relationships among components of business and its environment;

- Managing material and digital resources required to implement ideas;
- Planning for value creation and financially sustainable activities;
- Cooperating with artists and cultural workers in the development of business ideas;
- Creating work (e.g., scale models, artifacts) for presentation across various platforms, including social media and different environments;
- Documenting the artistic research processes and collecting data for the characterization of artistic activities.

4.3 Mapping entrepreneurship competences

The course encourages the implementation of the European Entrepreneurship Competence Framework (EntreComp) developed by the European Commission. This framework develops a comprehensive description of the necessary knowledge, skills, and attitudes people need to develop an entrepreneurial mindset and create financial, cultural, or social value for others [10].

EntreComp delineates 15 competencies across three key areas (*Ideas & Opportunities*, *Resources*, and *Into Action*) (see **Table 1**) that translate the meaning of being entrepreneurial. Each thematic unit of the course (Unit 1—Understanding Entrepreneurship in the CCIs, and Unit 2—Entrepreneurial Practice: Modeling a CCI Enterprise) is subdivided into four and six themes, respectively. These themes were designed to address specific competencies outlined within the EntreComp framework.

4.3.1 Ideas and Opportunities

Considering the main competencies referring to the group *Ideas & Opportunities*, as identified by the EntreComp framework, the FENICE project's course includes

Key area	Competences
Ideas & Opportunities	Spotting opportunities Creativity Vision Valuing ideas Ethical & sustainable thinking
Resources	Self-awareness & self-efficacy Motivation & perseverance Mobilizing resources Financial & economic literacy Mobilizing others
Into Action	Taking the initiative Planning & management Coping with uncertainty, ambiguity & risk Working with others Learning through experience

Source: [10].

Table 1.
EntreComp key areas and competences.

specific content themes that foster *spotting opportunities, creativity, valuing ideas, and ethical & sustainable thinking* competencies.

Students and adult learners are prompted to *spot opportunities* to create value *via* a deep understanding of the CCIs' social, cultural, and economic landscape, its cross-sectoral collaborations, and the potential market reach of the CCIs (theme 'Understanding CCIs'), thus being qualified to imaginatively identify needs and challenges still unmet within the cultural and creative sector.

Creativity is key for learners to envision viable solutions, thus developing value-creation ideas that effectively respond to the needs and challenges of the cultural and creative sector. In a theme entitled 'Creativity, Innovation and Cultural Content', the nature of the creative process is explored, including particular vocations that make the fabric of the CCIs team, as well as trends, knowledge, and resources that underpin innovative approaches in the cultural field.

This theme is also intertwined with the sub-topic 'Accountability and Ethical Behavior', pertaining to both legal frameworks and unwritten norms of the sector and corporate social responsibility issues. For this reason, *ethical & sustainable thinking*, guided not only by the tenet of acting responsibly but also by that of sustainability (*via* the assessment of the consequences and impact of ideas, opportunities, and actions on the target community, the market, society, and the environment), is also considered to be fostered alongside creativity. In fact, *ethical & sustainable thinking* is not exclusive to Unit 1 but is also promoted in all activities about the challenge of modeling a CCI business (Unit 2).

Lastly, *valuing ideas* involves the recognition of the potential an idea has for creating value—in social, cultural, and economic terms—and identifying suitable ways of making the most out of it, being students oriented toward the understanding of the contemporary challenges of a value-oriented approach to the design of products and services in the CCIs. A theme entitled 'Towards value: Economic, Market and Cultural valuation of products and services in the CCIs' was specifically designed to this end, emphasizing the differences between cultural value and economic value as socially constructed measures.

Although not connected to a single topic, vision, as the work toward one's vision of the future, involves nurturing learners' ability to envision a clear and compelling future scenario for their entrepreneurial endeavors. Creative exercises such as vision boards, storytelling, and mind mapping can help students visualize their future goals and understand more clearly how to turn ideas into action. This may be achieved by regularly scheduling reflection sessions where learners review their progress and refine their vision, getting feedback from peers, mentors, and instructors.

4.3.2 Resources

Regarding the main competencies listed under the area *Resources* within the EntreComp framework, the FENICE's course contents envision the development of *mobilizing resources, financial & economic literacy, and mobilizing others*.

In this course, students and adult learners are prompted to *mobilize* a diverse array of material, nonmaterial, and digital resources essential for turning ideas into action. This mobilization is facilitated by a deeper understanding of cultural policies, including their institutional, administrative, operative, and contextual aspects. Within Unit 1, this theme is further complemented by an exploration of intellectual property issues within the CCIs, focusing on designs, copyright, and related rights.

Additionally, the course addresses the importance of understanding basic concepts of new media and creative technologies, as well as the challenges associated with channels, formats, and delivery methods.

Unit 2's theme, 'Financing, Opportunities and Risks', emphasizes different financing instruments relevant to the development stages of a business venture in the cultural and creative sector, thereby contributing to *mobilizing resources*. Besides essential resources, launching a new business venture also requires the *mobilization of others* by obtaining the necessary support and instigating stakeholders' enthusiasm for the business idea. This competence is addressed through the development of effective communication, persuasion, negotiation, and leadership skills, particularly emphasized in Unit 2's first theme: 'Designing a business for the CCIs: preparing a business plan and pitching business ideas'.

Financial & economic literacy encompasses the ability to assess/estimate the cost of transforming an idea into a value-generating venture, ensuring its sustainability over the long term. It also involves the capacity to plan, execute, and evaluate financial decisions effectively. To this end, the course dedicates a theme ('Financing, Opportunities, and Risks') to addressing topics such as financial sustainability, access to financial resources, and associated risks and opportunities.

Apart from content-related activities, *self-awareness & self-efficacy*, as well as *motivation & perseverance*, are indirectly fostered through transversal activities within the teaching program. Students are encouraged to maintain reflective journals where they regularly document their thoughts, feelings, challenges, and successes, which are meant to help them understand their strengths, weaknesses, and areas for improvement. Additionally, self-assessment tools and personality tests may be implemented to assist students in better understanding their behavioral tendencies and how these may impact their entrepreneurial activities. Furthermore, students can be paired with mentors who provide guidance and feedback. These mentors, who may be guest speakers or successful entrepreneurs in the CCIs, also present case studies or share personal stories, focusing on their journeys, challenges, and strategies for overcoming obstacles.

4.3.3 Into Action

Considering the main competencies associated with *Into Action*, as identified by EntreComp, the proposed course seeks to promote: *planning & management, coping with uncertainty, ambiguity & risk, working with others, and learning through experience*.

Planning & management involves the ability to establish long-, medium- and short-term goals, define priorities and action plans, and adapt to unforeseen changes. Although learners may gain a complete understanding of these challenges only through practical entrepreneurial experiences, themes such as 'Designing a business for the CCIs: preparing a business plan and pitching business ideas' aim to offer students and adult learners a structured roadmap to systematize a new business idea, delineate operational and financial objectives, and assess business viability. This competence is further developed within the scope of Unit 2, with the themes 'Market, Competition, Consumption and Branding in CCIs (defining target markets, customer acquisition, and communicating the business proposition to establish a competitive advantage over competitors. It also addresses brand management and branding strategies)', 'Business models, systems, and partnerships' (rationale of how an enterprise creates, delivers, and captures value while contacting with renowned business model frameworks), and 'Management: team and change management in the CCIs'

(overview of the management process, considering the specificities of enterprises within the CCIs, and covering aspects from planning to organizing, staffing, leadership, and control).

Students are also encouraged to *cope with uncertainty, ambiguity, and risk* by gaining awareness of how to make decisions amidst uncertain circumstances or the potential for unintended outcomes. This involves recognizing the necessity to promptly and flexibly manage change. Students are also urged to embrace the practice of testing ideas and prototypes from early stages to mitigate the risks of failure. One of the primary tools contributing to this skill set is the preparation of a business plan, which facilitates decision-making across various scenarios and potential outcomes. In addition, a sub-topic exploring ‘Change management in the CCIs’ is integrated into the curriculum, addressing the rapidly evolving landscape within the CCIs, driven by factors such as digitalization and globalization.

Working with others is closely related to learners’ ability to *mobilize resources* and *mobilize others*, namely by working together and cooperating to develop ideas and put them into practice. Two themes within the course curriculum were specifically designed to cultivate this competence: ‘Business models, systems, and partnerships’ (that emphasizes the importance of partnerships and community cooperation within the CCIs; it explores the social, inclusive, and innovative aspects of CCIs, highlighting cross-sectoral collaborations and networking opportunities) and ‘Management: team and change management in the CCIs’ (focused on building and managing work teams, conflict management, and leadership skills in the dynamic landscape of the CCIs). Additionally, a theme was tailored specifically for adult learners, entitled ‘Entrepreneurship, Management, and Leadership in the CCIs’. This theme references the role of incubators, clusters, and creative partnerships at both the community and regional levels, as well as the specifics of managing and leading cultural and creative teams.

In the light of the rationale underlying the design of this course, both in terms of program content and delivery/teaching methods, *learning through experience* is considered a transversally developed competence. Particularly within Unit 2, the course adopts a learning-by-doing, action-oriented approach that aligns with teaching techniques aimed at stimulating learners’ activity, motivation, and participation. This approach is in line with challenge-based [25] or problem-based methodologies [26].

Not only are these competencies promoted through a teaching-learning approach to various themes and corresponding program contents, but also through the application of an active pedagogy paradigm. Various teaching strategies have been equated, including activities with peer-evaluation feedback, group projects, competition simulations, and guest lectures featuring entrepreneurs and mentors from the CCIs. These strategies allow students to learn collaboratively with peers and mentors, as well as to reflect and learn from both their own and others’ successes and failures. Such strategies also contribute to the development of other competencies, such as *working with others*, *coping with uncertainty, ambiguity & risk*, or *valuing ideas*. In fact, the FENICE project makes use of a variety of teaching, learning, and assessment methods, tailored to the needs of the students and the learning objectives, in line with the principles of experiential and active learning [27–30].

Besides the competencies which are specifically addressed by content themes within the course, not connected to a single topic, *taking the initiative* is associated with several activities. Not only students are assigned to real-world projects in which they take the initiative in identifying and tackling a problem or opportunity

within the CCIs, but taking part in challenges or competitions can also help students to proactively come up with innovative solutions within a limited timeframe. In classroom context, assigning (and rotating) leadership roles in group projects, gives each student the opportunity to lead, make decisions, and take initiative in managing project activities.

Indeed, these competencies can be interpreted as achieved learning outcomes, validated through the learner's autonomous application of knowledge and skills in practical, societal, and professional contexts. Learning outcomes are validated by their alignment with competencies, which serve as benchmarks for assessing the learner's proficiency and capability in specific areas. As learners demonstrate their ability to effectively apply acquired knowledge and skills in real-world scenarios, they validate the attainment of learning outcomes and, consequently, competencies.

4.4 Assessing entrepreneurial competences

Experiential learning methods can enhance entrepreneurial and managerial abilities within the CCIs, thereby fostering the sustainable growth and operation of the creative economy [30]. Therefore, the teaching and learning approaches employed in this course are grounded in experiential learning principles [27]. Some principles that characterize the experiential learning model include active learning [31], autonomous student work, flexible learning pathways, and a diversity of assessment methods, among others. These principles ensure that teaching, learning, and assessment processes are aligned with student learning outcomes and needs. Active learning fosters the development of higher-order cognitive skills among students, as they actively engage in participatory learning processes. To this end, the role of teachers evolves from the traditional approach of imparting knowledge to guiding students through their learning journey and assuming the role of facilitators [32]. This shift empowers students to take ownership of their learning and encourages independent thinking and problem-solving skills crucial for success in the dynamic landscape of the CCIs.

Assessing competencies is vital for recognizing the achievement of learning outcomes within a particular program. Following the conclusion of a learning process, whether formal, informal, or a combination of both, individuals may demonstrate acquired knowledge, skills, and competencies [11]. These learning outcomes become tangible through assessment processes and/or specific tasks aimed at showcasing the acquired learning. Hence, ensuring alignment between learning outcomes, teaching and learning strategies, and assessment methods is crucial.

In assessing entrepreneurial competencies, the assessment process was designed to align with the progression levels identified in the EntreComp framework [10]. The framework delineates eight progression levels, ranging from foundation to intermediate, advanced, and expert levels [10]. Each learning outcome is mapped from the most basic to advanced progression levels to support the development and growth of entrepreneurial capacity. It is essential to consider the progression of learners over time, recognizing their diverse starting points and designing a coherent entrepreneurship skills pathway. This mapping ensures that learners' growth and development of entrepreneurial competencies are effectively monitored and supported throughout their learning journey.

The assessment process incorporated into the courses developed within the FENICE project encompasses the following assessment methods to achieve the defined learning outcomes:

- *Individual/group e-portfolios of case studies of CCI firms:* Learners will develop an e-portfolio to engage in the research process within the field of CCIs. The e-portfolio will feature a detailed case study of CCIs, grounded in a real-world scenario encountered by a real firm.
- *Individual project (business plan):* Learners are tasked with formulating and presenting an individual project for an existing or hypothetical firm. The presentation can take various formats, such as pitching, moot presentations, or autoscopy. Self and peer-assessment processes will be implemented to evaluate individual performance.
- *Unit and final exams:* At the end of each unit or at the end of the course, learners may undergo examinations to assess their knowledge and skills. The exam format can include diverse question types, including multiple-choice questions, open-ended questions, or the analysis of case studies, tailored to the proficiency level of the trainees, ranging from foundational to advanced levels or practice-oriented training.

In summary, both problem and project-based learning (PBL) and challenge-based learning are educational approaches deemed suitable for fostering entrepreneurship education [25, 26]. These methodologies provide meaningful opportunities for the development and assessment of entrepreneurial competencies. By engaging learners in real-world problems or challenges, PBL and challenge-based learning enable them to apply their knowledge and skills in practical contexts, fostering the development of entrepreneurial mindset and competencies [33, 34].

5. Conclusions

This chapter addresses the application of entrepreneurial education in the CCIs, focusing on the use of the European Entrepreneurship Competence Framework (EntreComp) to design teaching programs for the cultural and creative sector and develop an entrepreneurial mindset.

Entrepreneurship has emerged as a recognized field of knowledge and one of the fundamental pillars of education. However, there is a growing recognition of the need for deeper understanding and more extensive research into the teaching and application of entrepreneurship, particularly within the context of CCIs. Encouraging entrepreneurial education not only facilitates more comprehensive interdisciplinary learning but also nurtures crucial entrepreneurial skills necessary for success. Enhancing the competitiveness of CCIs within national economies requires not only the promotion of investment projects and the innovation and internationalization of cultural and creative activities but also the development of human capital. By adopting experiential learning approaches, entrepreneurship education provides students with a practical understanding of entrepreneurship and its real-world applications. This methodology helps students cultivate essential skills such as creativity, autonomy, critical thinking, problem-solving, decision-making, self-awareness, and collaboration.

The CCIs are content, knowledge-intensive, and technology-driven industries that require interdisciplinary research and education. However, there are persistent skills gaps in the sector, particularly with regard to entrepreneurship [6]. Primarily

driven by creative talent, the cultural and creative sectors are predominantly made up of micro, small, and medium-sized enterprises, as well as independent entrepreneurs. These sectors heavily rely on freelance workers who often engage in informal networks to exchange creative ideas. Despite the presence of highly skilled human resources, there is still a need to enhance entrepreneurship and business skills within the creative and cultural sectors. The diverse and dispersed nature of activities within the CCIs contributes to its ongoing consolidation process. However, this diversity does not diminish the significant economic relevance and employment opportunities generated by the CCIs, which continue to grow in the European context. Nevertheless, a considerable portion of the creative industries still lack consolidation and rely heavily on government support, both financially and administratively. Public institutions play a significant role in providing contracts and support to sustain these sectors [6, 35].

The FENICE Erasmus+ Project aims to offer a focused understanding of the operations of the cultural and creative sector by addressing practical and pertinent issues relevant to creative businesses and entrepreneurs. This initiative holds significant potential for the development of entrepreneurial competencies within the CCIs. By viewing entrepreneurship as a transversal competence, the EntreComp framework emerges as a valuable conceptual model. It provides a structured approach to customize entrepreneurial learning outcomes for the unique context of the cultural and creative sector, facilitating the design of teaching and learning activities that promote entrepreneurial competencies, as well as the development of assessment methods for entrepreneurial learning.

Entrepreneurial learning outcomes serve as a valuable guide for outlining and assessing students' progress. By clearly defining these outcomes, students gain a better understanding of the goals they need to achieve, as well as the standards, methods, and evaluation criteria that will be used to assess their achievements. This transparency in learning objectives empowers students to strive toward their goals more effectively and efficiently. Moreover, the dissemination of learning outcomes ensures that students are well-informed about the skills and competencies they are expected to develop.

EntreComp plays a crucial role in this process by providing a framework for defining and understanding entrepreneurial competencies. By aligning with EntreComp, educational programs can equip students with specialized managerial skills relevant to CCIs, while also promoting their entrepreneurial talents. Additionally, EntreComp fosters students' ability to collaborate and work effectively in interdisciplinary teams within the cultural and creative context, thereby preparing them for the realities of the contemporary cultural and economic realities. For instance, engaging in activities such as developing a business plan within an experiential learning environment encourages students to gain insights into management principles and techniques, as well as project and company management specific to CCIs. This hands-on approach not only enhances their entrepreneurial abilities but also equips them with practical skills for navigating the complexities of the creative industries.

This chapter contributes to a deeper understanding of the potential of entrepreneurship education to foster an entrepreneurial mindset, with a specific focus on the key entrepreneurial competencies outlined in the EntreComp framework. Future research should aim to further empirically investigate the development of an entrepreneurial mindset using the EntreComp framework, particularly in the context of implementing courses such as those offered by the FENICE project and other entrepreneurship programs in higher education. Empirical studies could examine the

effectiveness of these courses in enhancing students' entrepreneurial competencies and mindset, providing valuable data on the impact of entrepreneurship education initiatives. By assessing the development of entrepreneurial competencies among learners enrolled in these programs, researchers can gain a deeper understanding of the practical outcomes and effectiveness of entrepreneurship education in fostering an entrepreneurial mindset. One limitation of this study is its reliance on the experience of curriculum design within the scope of the FENICE project without empirical data to assess the actual development of entrepreneurial competencies among learners. Future research may address this limitation by conducting empirical studies to evaluate the impact of entrepreneurship education initiatives on the development of an entrepreneurial mindset in the CCIs.

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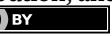
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Chapter 3

Rural Youth Entrepreneurship: Digital Learning Opportunities and Implementation Challenges

*El Houssain Bouichou, Aziz Fadlaoui and
Fatima Zahra Benbrahim*

Abstract

This chapter investigates the nexus between entrepreneurship and rural development, focusing on a comparative analysis of female and male entrepreneurs. Conducted in the Fes-Meknes region of Morocco, the research aims to explore how the characteristics of entrepreneurs influence their impact on rural development initiatives. We surveyed a sample of 190 individuals, comprising 115 male and 75 female entrepreneurs, and employed econometric analysis using binary logistic regression to analyze the data. The chapter aimed to compare the socioeconomic characteristics, business attributes, technological factors, and entrepreneurial behaviors of male and female entrepreneurs, as well as their impact on rural development. The results of the analysis showed significant differences between male and female entrepreneurs in various aspects, such as education level, household income, family situation, access to financial resources, business sector involvement, legal structure, years in operation, and target market preferences. Additionally, the chapter found that male entrepreneurs tended to utilize digital technologies more extensively and benefit more from entrepreneurship training compared to their female counterparts. However, female entrepreneurs demonstrated a higher propensity for contributing to rural development initiatives through their businesses, particularly in agribusiness-related activities.

Keywords: digital learning opportunities, gender dynamics, implementation challenges, logistic regression analysis, rural areas, youth entrepreneurship

1. Introduction

Youth entrepreneurship is the initiative of individuals who are typically under the age of 30 to establish and manage a business [1]. These youthful entrepreneurs often showcase inventive thinking, creativity, and a resilient determination to thrive in the business realm [2]. Despite encountering hurdles such as limited resources and experience, youth entrepreneurship holds the promise of infusing fresh concepts and vigor into the market, thereby propelling economic expansion and job generation [3]. With the advent of technology and the growing interconnectedness of the global market, young entrepreneurs

are discovering novel and enticing opportunities to leave their imprint [4]. They use social media and other online platforms to expand their reach and gain valuable insights into consumer preferences [5]. Moreover, a fervent commitment to addressing social and environmental concerns drives a considerable number of young entrepreneurs to establish businesses that prioritize sustainability and societal welfare [6].

Digital learning opportunities are indispensable for young entrepreneurs navigating the swiftly changing business terrain [7]. By acquiring expertise in domains such as digital marketing, e-commerce, and data analytics, they can remain competitive and innovative in their endeavors [8]. Moreover, access to online courses and resources enables youth entrepreneurs to perpetually learn and adapt to evolving market dynamics, thereby facilitating the establishment of successful and sustainable enterprises [9]. In today's digital era, the ability to embrace technology and harness digital learning is critical for the growth and prosperity of young entrepreneurs within the global economy. With the proliferation of social media platforms and online avenues, youth entrepreneurs have myriad opportunities to broaden their audience reach and engage with customers worldwide [10]. They can cultivate brand recognition, interact with their target demographic, and drive sales by effectively utilizing these tools. Additionally, the ability to monitor and analyze data from their online activities provides valuable insights that inform strategic decision-making and optimize business processes. According to the authors in Ref. [11], embracing technology and digital learning not only empowers youth entrepreneurs to excel in the contemporary business landscape but also positions them for long-term success.

As technology advances, the potential for young entrepreneurs is boundless. They can leverage social media platforms, e-commerce portals, and digital marketing tactics to expand their presence and scale their enterprises. The data-driven nature of digital tools enables them to make informed decisions and swiftly adapt to shifting market trends. By staying proactive and embracing innovation, youth entrepreneurs have the ability to make significant strides in the business realm and secure a prosperous trajectory for themselves [12]. Equipped with a wealth of information and networking opportunities online, young entrepreneurs can seamlessly collaborate with industry experts and seek mentorship to augment their skills and understanding. Moreover, by remaining abreast of emerging trends and advancements in their respective sectors, they can maintain a competitive edge and perpetuate innovation, disrupting conventional business paradigms [13]. With adept utilization of technology and a penchant for change, these ambitious individuals harbor the potential to exert a transformative influence on the business landscape and shape the trajectory of entrepreneurship [14].

Youth entrepreneurship plays a pivotal role in fostering innovation and economic vitality, particularly in rural areas where conventional employment avenues may be scarce. The integration of digital technologies with entrepreneurial pursuits has ushered in a new era of opportunities for young individuals to embark on their business ventures [15]. However, in the rural landscape of Morocco, characterized by pronounced socioeconomic disparities, the convergence of youth entrepreneurship and digital learning presents a multifaceted array of challenges and prospects.

Recognizing the importance of youth entrepreneurship in rural economic development, the infusion of digital learning opportunities holds promise to fundamentally reshape the entrepreneurial landscape in these regions [16]. By leveraging technology and digital resources, young entrepreneurs can tap into a vast reservoir of knowledge and skills essential for driving sustainable growth and fostering innovation within their communities. Yet, the effective integration of these digital learning opportunities also confronts its own set of hurdles that necessitate attention and resolution [17].

Despite the pivotal role of digital technology in Morocco, particularly underscored by its significance during the COVID-19 pandemic, there remains a critical need to explore its implications in rural areas. The rural sector stands poised to leverage digital advancements, yet a comprehensive understanding of the associated issues, opportunities, and challenges remains elusive. New technology can be an important means of reducing transaction costs and stimulating agricultural projects [18–20].

Thus, this chapter aims to delve into the intricacies of digital integration in rural Morocco. By elucidating the multifaceted landscape of digital adoption, we endeavor to uncover the potential avenues for development and the barriers hindering progress. Through this exploration, we aspire to offer insights that can inform strategies to harness the transformative power of digital technology for rural advancement. Our investigation, centered on a case chapter of rural youth entrepreneurship in Meknes province, explores digital learning opportunities and scrutinizes the challenges entailed in their implementation. This chapter delves into the nuanced dynamics of youth entrepreneurship in rural Morocco, with a specific focus on the unique experiences of both young males and females. By examining the digital learning avenues accessible to aspiring entrepreneurs, our objective is to shed light on the intricacies of their entrepreneurial endeavors. We strive to unveil the barriers obstructing their access to digital resources and elucidate the innovative strategies they employ to navigate the entrepreneurial landscape. Drawing upon empirical evidence and case studies, this chapter undertakes a comprehensive analysis of the implementation challenges encountered by rural youth entrepreneurs, irrespective of gender. By delving into the gender-specific dimensions of entrepreneurship in rural Morocco, we aim to uncover the underlying factors that shape young people's entrepreneurial aspirations and outcomes.

2. Literature review

Over the years, both female and male entrepreneurs have been subjects of extensive research [21–23]. Recently, scholars have increasingly emphasized the interconnectedness of technology and entrepreneurship [24]. With the proliferation of digital technologies and artifacts, scholars have underscored the importance of understanding how digital entrepreneurs utilize these technologies, particularly in rural areas [25, 26]. Furthermore, studies exploring the impact of digital technology on rural women's entrepreneurship [1, 27, 28] echo the call for a more nuanced examination of how technology usage influences female and male entrepreneurship in rural regions. Our chapter aims to assess how digital technology shapes the practical, peripheral, and parochial knowledge resources of female and male entrepreneurs in rural communities. To achieve this goal, we conducted a comprehensive literature review focusing on entrepreneurship among rural women and men. Our goal was to conduct an in-depth analysis of digital learning opportunities and the obstacles to their implementation.

2.1 Overview of implementation challenges

The implementation of strategies in youth entrepreneurship may encounter several challenges, including the necessity for constant adaptation to evolving technologies and market dynamics. Young entrepreneurs might also contend with competition

from established businesses and encounter difficulties in securing funding for their ventures [29]. Furthermore, striking a balance between work and personal life and managing the stress inherent in business ownership can pose additional hurdles to success [23]. However, despite these challenges, with perseverance and a readiness to learn from setbacks, young entrepreneurs can surmount these obstacles and realize their objectives within the dynamic entrepreneurial landscape [26].

The authors in Ref. [28] emphasize the critical importance of resilience and adaptability for young entrepreneurs in addressing challenges. They argue that to foster innovation and sustain competitiveness within their sector, these entrepreneurs must remain open to feedback and new ideas, embracing a mindset of continuous improvement. Moreover, [30] underscore the significance of maintaining a strong work ethic and a clear vision for their enterprise, which can serve as guiding principles during times of adversity, ensuring focus and motivation. The authors in Ref. [25] assert that with determination and persistence, young entrepreneurs are well-equipped to overcome any obstacles encountered along their journey and ultimately achieve their long-term aspirations.

On the other hand, the authors in Ref. [31] underscore the imperative for young entrepreneurs to thrive in the dynamic and ever-evolving business environment by embracing calculated risks and venturing beyond their comfort zones. According to the authors in Ref. [32], this may involve exploring new markets, innovating products or services, or forging strategic alliances with fellow businesses. By proactively taking bold steps, these entrepreneurs can position themselves as trailblazers in their industries and drive growth for their enterprises. Moreover, the researchers highlight the significance of networking and cultivating relationships with professionals, which offer invaluable avenues for collaboration and mentorship. Surrounded by a robust support network, young entrepreneurs gain access to valuable insights and guidance to navigate the unpredictable terrain of entrepreneurship [32, 33]. This support system also provides access to essential resources, funding opportunities, and potential clientele, bolstering their prospects for success in the competitive business landscape.

2.2 Learning opportunities for youth entrepreneurs

Digital learning resources provide young entrepreneurs with a convenient and accessible avenue to acquire essential skills and knowledge for success [34]. Encompassing diverse subjects such as marketing, finance, leadership, and technology, these resources empower entrepreneurs to enrich their expertise and remain competitive in today's dynamic business milieu [24]. Furthermore, online courses offer entrepreneurs the flexibility to learn at their own pace, tailoring their educational journey to align with their individual objectives and preferences [22]. By embracing digital learning, entrepreneurs can establish a robust foundation for their ventures and realize their long-term aspirations [26].

In a comprehensive synthesis of studies by the authors in Refs. [35–37], it becomes evident that online courses serve as a pivotal resource for entrepreneurs seeking to deepen their proficiency in specific domains and adapt to evolving market trends. These courses provide entrepreneurs with the flexibility to learn at their own pace, seamlessly incorporating learning into their daily routines without causing disruption. By staying abreast of industry advancements and adopting best practices, entrepreneurs position themselves as trailblazers and catalysts for innovation within their enterprises. In a rapidly evolving business landscape, ongoing learning is imperative for maintaining a competitive edge and fostering sustainable growth. Various learning

avenues, including online courses, webinars, and networking events, offer individuals invaluable opportunities to glean insights from industry experts and thought leaders, enabling professionals to deepen their expertise and broaden their skill set across diverse domains. Exposure to varied perspectives facilitates more informed decision-making and enhances adaptability in confronting novel challenges. Continuous learning not only enriches the individual but also bolsters the overall success and competitiveness of their business.

Those who prioritize continuous learning are well-equipped to navigate uncertainties and seize emerging opportunities in an ever-evolving business landscape [38]. Embracing these adaptable learning opportunities enables young entrepreneurs to continually evolve and enhance their professional acumen without disrupting their daily lives [39]. In today's fast-paced milieu, the ability to customize one's learning experience is a prized asset that propels career growth.

The authors in Refs. [22, 40] have underscored the critical importance of interactive learning platforms for young entrepreneurs. These platforms offer an immersive learning experience that surpasses the capabilities of traditional teaching methods. Interactive platforms empower young entrepreneurs by providing hands-on engagement and practical scenarios, allowing them to apply theoretical knowledge directly to their future business endeavors. This experiential learning approach enables learners to delve deeper into intricate concepts and cultivate critical thinking and problem-solving proficiencies highly valued in today's professional landscape. Additionally, the interactive nature of these platforms fosters active participation and engagement, enhancing the overall learning experience and facilitating a deeper understanding of complex topics. Through interactive learning, young entrepreneurs can develop the practical skills and competencies necessary to navigate the challenges of entrepreneurship and succeed in their ventures.

2.3 Limited infrastructure in rural and underprivileged areas

Previous research has highlighted the considerable challenge rural entrepreneurs face in accessing untapped markets. However, a strategic investment in critical infrastructure, including transportation networks, telecommunications, and internet accessibility, can effectively unlock new avenues for expansion for young entrepreneurs [41, 42]. Collaborating with local authorities and organizations to enhance essential services not only benefits the community but also fosters a more conducive environment for business growth [27]. By addressing these challenges head-on, companies can penetrate previously unreachable markets and positively impact the lives of individuals in underserved regions. This literature underscores the transformative potential of infrastructure development in facilitating economic growth and fostering entrepreneurship in rural areas. Additionally, it emphasizes the importance of public-private partnerships and community engagement in creating an enabling environment for business development and societal advancement. Through targeted interventions and collaborative efforts, stakeholders can work together to overcome barriers to market access and unlock the full potential of rural entrepreneurship.

Drawing from the insights of the authors in Ref. [25], as well as in Ref. [43], it is evident that forging partnerships with local organizations and supporting community initiatives is instrumental for youth entrepreneurship seeking to integrate themselves within the fabric of rural communities. By prioritizing community needs and values, rural entrepreneurship not only contributes to local economies but also enhances the overall well-being and prosperity of rural areas. The author in Ref. [44] highlights the

significant role that digital youth entrepreneurship plays in fostering unity and cohesion within diverse communities through their active engagement and support of local initiatives. Such collaborative efforts not only benefit businesses but also have far-reaching positive impacts on societal well-being and rural development.

3. Materials and method

3.1 Selection of study area

The study areas receive significant attention from government bodies, emphasizing the critical role of digital learning in fostering youth entrepreneurship. This is achieved through the provision of diverse digital platforms and distance training services. This collaborative effort between governmental entities and economic stakeholders ensures the alignment of digital initiatives with the specific needs of young entrepreneurs in rural areas, ultimately enhancing the effectiveness of digital learning endeavors. Based on the provided information about the province of Meknes, we could divide the province for further investigation into several key aspects (**Figure 1**). Firstly, exploring the disparities in entrepreneurial opportunities between urban and rural areas, given that 82.3% of the population resides in urban settings while only 17.7% lives in rural areas, would provide valuable insights into the unique challenges and opportunities in each context. Additionally, with 15 out of 21 communes classified as rural, investigating the socioeconomic characteristics and infrastructure development in these rural communes can offer insights into the feasibility and effectiveness of digital learning initiatives for aspiring entrepreneurs. Moreover, considering the significant proportion of the population aged under 35 (58.2%) and the dominance of

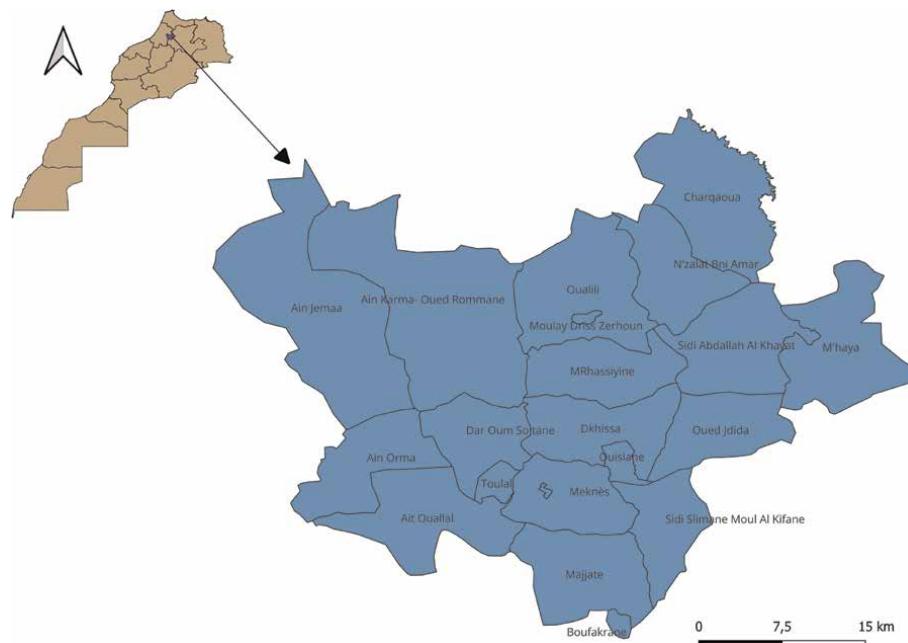


Figure 1.
Map of the study area: Meknès province.

the 15–59 age group (64%), there is considerable potential for youth entrepreneurship in the Prefecture of Meknes, warranting an examination of the factors influencing youth entrepreneurship and access to digital resources. Lastly, understanding the existing infrastructure and economic landscape, including transportation networks, telecommunications, and prevalent economic activities, is crucial for assessing the readiness of rural areas for digital learning initiatives and identifying specific skill and knowledge demands among aspiring entrepreneurs. By exploring these study areas, researchers can develop a comprehensive understanding of the entrepreneurship ecosystem in the Prefecture of Meknes and devise strategies to promote digital learning and support rural entrepreneurship, particularly among youth.

3.2 Data collection

3.2.1 Sample description

The data collection process for this study involved selecting a sample of rural entrepreneurs from Meknès province using a simple random sampling technique. The sample frame comprised registered male and female entrepreneurs engaged in rural entrepreneurship activities within the province. The study included a total of 190 rural entrepreneurs, randomly selecting 115 males and 75 females from the sample frame.

We employed a multifaceted approach to collect data from young rural entrepreneurs, aged between 18 and 40, affiliated with the regional Centre for Young Entrepreneurs in the Food Industry (RCYEFI) in Meknes province, representing various economic activities and agricultural enterprises. Initially, we developed structured questionnaires tailored to each type of economic activity and agricultural enterprise to collect both quantitative and qualitative data on demographics, business activities, challenges, utilization of digital tools, and future aspirations. We organized focus group discussions with representatives from each economic activity and agricultural enterprise to delve deeper into experiences, challenges, and perspectives on digitalization, with a moderator guiding discussions on relevant topics. Additionally, we conducted semi-structured interviews with a subset of young rural entrepreneurs to gather rich qualitative data on their individual experiences, motivations, and strategies for leveraging digital tools. Furthermore, we conducted observational research to observe the daily operations and practices of young rural entrepreneurs, with a focus on their use of digital tools, interactions with stakeholders, and overall business activities, to understand the impact of digitalization. Finally, we utilized online platforms like social media groups and forums dedicated to young rural entrepreneurs to distribute surveys, conduct virtual focus group discussions, and engage with participants remotely, thereby facilitating data collection from geographically dispersed entrepreneurs.

3.2.2 Selections of variables and their description

Previous studies have shown that the level of digital literacy significantly impacts an individual's ability to utilize digital learning platforms effectively [44]. Higher levels of digital literacy are associated with increased engagement and proficiency in online learning activities, which can influence the likelihood of pursuing entrepreneurial endeavors [45]. Research indicates that access to technology, such as smartphones and computers, is a critical determinant of participation in digital learning programs [46]. Limited access to technology can hinder individuals, particularly those in rural areas, from engaging in online education and accessing digital resources

necessary for entrepreneurial development [47]. Previous research has highlighted various implementation challenges, such as lack of infrastructure and financial constraints, as significant barriers to entrepreneurial success in rural areas [26]. These challenges can impede the effective utilization of digital learning opportunities and hinder entrepreneurial ventures [48]. Studies have shown that prior entrepreneurial experience positively influences individuals' readiness to engage in entrepreneurial activities [21]. Experience starting or running a business may influence the use of digital learning platforms and the implementation of entrepreneurial strategies [49]. A comprehensive review of existing literature on factors influencing youth entrepreneurship and digital learning opportunities informs the choice of these variables.

Perceived barriers to digital learning, as highlighted in studies by the authors in Ref. [50], are crucial determinants shaping individuals' attitudes and intentions toward engaging in online education. Understanding these barriers, such as issues related to accessibility and relevance, is essential for designing effective digital learning programs tailored for entrepreneurial development. Social support and networking, as emphasized by the authors in Ref. [51], play a vital role in fostering entrepreneurial success. Active involvement in entrepreneurial support networks and interactions with peers can significantly impact individuals' access to digital learning resources and collaborative opportunities. By exploring these social dynamics, we can gain insights into how networking influences the utilization of digital learning platforms among aspiring entrepreneurs.

Motivation for entrepreneurship, as discussed in studies by the authors in Ref. [52], is a key predictor of entrepreneurial intentions and behaviors. Individuals with intrinsic motivation, driven by factors such as autonomy and a passion for innovation, are more likely to seek out digital learning opportunities to enhance their entrepreneurial skills and knowledge. Understanding the motivational factors driving individuals' engagement with digital learning is crucial for designing effective educational interventions. Gender-specific challenges, as highlighted by the authors in Ref. [53], pose significant barriers to women's participation in entrepreneurship and their access to educational opportunities. Exploring these challenges in the context of digital learning is essential for promoting gender equality in entrepreneurship. By addressing gender-specific barriers, we can create more inclusive digital learning environments that cater to the needs of all aspiring entrepreneurs, regardless of gender.

Drawing upon the insights gleaned from the literature review and considering the unique context of digital learning for entrepreneurship in rural settings, we have meticulously chosen the variables outlined in **Table 1**. We have carefully selected these variables to capture the multifaceted aspects that influence the utilization of digital learning opportunities among aspiring entrepreneurs in rural areas. By incorporating these variables into our study framework, we aim to comprehensively explore the intricate dynamics at play and gain a deeper understanding of how digital learning interfaces with entrepreneurial endeavors in rural contexts.

3.3 Econometric model

In this study, we employ an econometric approach using logistic regression to examine the dynamics of rural entrepreneurship, with a specific focus on the distinct factors that influence the likelihood of individuals identifying themselves as female or male entrepreneurs. Logistic regression is a statistical tool that is capable of modeling binary outcomes, making it well-suited for discerning the probability of becoming a female or male entrepreneur based on a set of independent variables. The logistic

Variable name	Nature of the variable	Description	Sign
Dependent variable			
Gender	Dichotomous	0 = Female Entrepreneur 1 = Male Entrepreneur	
Education level	Numerical variable		+
Access to technology	Dichotomous	Availability of reliable internet connection: 0 = No, Yes = 1	+−
Participation in digital	Dichotomous	Enrollment in online courses or digital training programs: 0 = No, Yes = 1	−
Learning programs	Dichotomous	Frequency of participation in digital learning activities: 0 = daily, 1 = Otherwise	−
Implementation challenges	Dichotomous	Inadequate internet connectivity: 0 = No, Yes = 1	+
Availability of funding	Dichotomous	Financial support for digital learning: 0 = No, Yes = 1	+
Digital literacy level	Category variable	Level of proficiency in using digital tools and platforms: 0 = basic, 1 = Otherwise	+
Entrepreneurial experience	Dichotomous	Duration of involvement in entrepreneurial activities: 0 = Less than 3 year, 1 = more than 3 years.	+
Perceived barriers to digital learning	Dichotomous	Perception of digital learning platforms as accessible and user-friendly: 0 = agree, 1 = disagree	+−
Perception of digital learning	Dichotomous	Perception of digital learning as relevant and beneficial for entrepreneurial endeavors: 0 = agree, 1 = disagree	+
Social support and networking	Category variable	Frequency of interaction with other entrepreneurs or business professionals: 0 = daily, 1 = weekly	+

Table 1.
Variables description.

regression equation typically represents the probability (π) of an event occurring, with $(1-\pi)$ representing the probability of the event not occurring (Eq. 1). Therefore, thanks to this model, we can effectively estimate the probability of the event occurring:

$$\text{adds} = \frac{\pi}{1 - \pi} \quad (1)$$

According to Eq. 2, the logit function is dependent on a single predictor variable, which is as follows:

$$\log\left(\frac{\pi}{1 - \pi}\right) = \beta_0 + \beta_1 x \quad (2)$$

Eq. 3 represents the precise formulation of the generic linear logistic model:

$$\log \ln \pi_j = \log \left(\frac{\pi}{1 - \pi_j} \right) = X_j^T \beta \quad (3)$$

Eq. 4 presents the logistic model as follows:

$$\log_e \left(\frac{p_i}{1 - p_i} \right) = \alpha + \beta x_i \quad (4)$$

In addition to dummy variables that stand in for the covariates, X_i is a collection of measures that describe the levels of the components. This category includes both the continuous and dichotomous forms of independent variables. For the purpose of obtaining the values of the parameters π_j and β , the log-likelihood function is brought to its maximum value. The objective is to estimate the probability that $P(Y = 1/X)$. Y is the dependent variable that indicates gender in a binary fashion (Eq. 4). The symbol o in this equation represents the independent factors that influence the chance of being a youth entrepreneur (male or female). This research aims to determine the likelihood of people engaging in digital learning using a binary logistic regression model. More specifically, the primary focus of this investigation is the differentiation between female and male entrepreneurs. In this particular investigation, we make use of the IBM SPSS Statistics 22 program to carry out the logistic regression analysis.

Using Eq. 5, one can compute the odds ratio:

$$\psi = \frac{\text{Male Entrepreneur when } X + 1}{\text{Female Entrepreneur when } X + 0} = \frac{X = 1 \text{ when } Y = \frac{1}{X} = 1 \text{ when } Y = 0}{X = 0 \text{ when } Y = \frac{1}{X} = 0 \text{ when } Y = 0} = \frac{\pi(1)}{1 - \pi(1)} = \frac{\pi(0)}{1 - \pi(0)} \quad (5)$$

Here, π refers to the probability that $Y = 1$. So, $\pi(1)$ is the when $Y = 1$ and $X = 1$, and $\pi(0)$ is when $Y = 1$ when $X = 0$.

4. Results and discussion

4.1 Descriptive statistics

Table 2 presents the descriptive statistics for the explanatory variables utilized in the logistic regression analysis, offering insights into various aspects of the study. The data indicates that out of the entrepreneurs included in the study, 75 are female, constituting a significant portion, whereas the majority, totaling 115, are male. This gender distribution sheds light on the composition of the entrepreneurial landscape under examination. Furthermore, the data highlights that approximately 54.74% of the respondents reported having access to a reliable internet connection, underscoring the presence of a substantial portion of individuals equipped with the necessary technological infrastructure for digital learning endeavors. This insight is pivotal for understanding the digital readiness of the sample population. Moreover, a noteworthy finding emerges regarding the engagement of respondents in digital learning activities. A majority, comprising 56.84% of the participants, reported enrolling in online courses or digital training programs, indicating a robust interest and active involvement in digital learning initiatives among young entrepreneurs situated in rural locales. This trend signifies a growing recognition of the value and potential of digital education in enhancing entrepreneurial skills and knowledge. Additionally, the data reveals varying levels of commitment to digital learning among the respondents. While 47.89% reported engaging in digital learning activities on a daily basis, a slightly larger proportion, accounting for 52.11%, participated less frequently. This diversity

		Frequency	Percent	Valid percent	Cumulative percent
Access to technology	No	86.00	45.26	45.26	45.26
	Yes	104.00	54.74	54.74	100.00
Participation in digital	No	82.00	43.16	43.16	43.16
	Yes	108.00	56.84	56.84	100.00
Learning programs	No	99.00	52.11	52.11	52.11
	Yes	91.00	47.89	47.89	100.00
Implementation challenges	No	100.00	52.63	52.63	52.63
	Yes	90.00	47.37	47.37	100.00
Availability of funding	No	116.00	61.05	61.05	61.05
	Yes	74.00	38.95	38.95	100.00
Digital literacy level	Basic	90.00	47.37	47.37	47.37
	Intermediate	100.00	52.63	52.63	100.00
Entrepreneurial experience	Less than 3 year	91.00	47.89	47.89	47.89
	More than 3 years	99.00	52.11	52.11	100.00
Perceived barriers to digital learning	Agree	83.00	43.68	43.68	43.68
	Disagree	107.00	56.32	56.32	100.00
Perception of digital learning	Agree	98.00	51.58	51.58	51.58
	Disagree	92.00	48.42	48.42	100.00

Table 2.
Statistics descriptive statistics of dichotomous and category variables (n = 190).

in engagement frequency highlights the nuanced nature of digital learning adoption within the sample population, suggesting the presence of differing preferences or constraints influencing participation levels.

Authors' own estimations, Survey (2023).

In terms of implementation challenges, funding availability, and digital literacy level, the analysis of the reformulated data reveals several key findings. Firstly, nearly half of the respondents (47.37%) cited inadequate internet connectivity as a major challenge. Emphasizing the critical need to address infrastructure limitations in rural areas to facilitate digital learning initiatives effectively. Secondly, a significant majority (61.05%) reported a lack of financial support for digital learning. This indicates the necessity for increased funding opportunities to enhance access to educational resources for rural entrepreneurship. This highlights the crucial role that financial assistance plays in promoting equitable access to digital education. Thirdly, the sample population demonstrated a balanced distribution in terms of digital literacy levels. We classified approximately 47.37% as having basic proficiency and 52.63% as intermediate. This suggests a moderate level of digital skills among the respondents, which could serve as a foundation for further enhancement through targeted education and training programs. In summary, the findings underscore the pressing need to address

	N	Minimum	Maximum	Mean	Std. deviation	Variance
Education	190	4.00	15.00	9.13	2	3.94

Table 3.
Descriptive statistics of numerical variable.

infrastructure limitations, increase funding opportunities, and provide targeted digital skills training to promote equitable access to digital learning in rural areas, thereby fostering entrepreneurship and socioeconomic development.

Concerning entrepreneurial experience, perceived barriers to digital learning, and perception of digital learning, the data reveals intriguing trends and diverse perspectives among respondents. Firstly, in terms of entrepreneurial experience, there is a balanced distribution, with roughly equal proportions of respondents reporting having less than 3 years (47.89%) and more than 3 years (52.11%) of entrepreneurial experience. This suggests a mix of novice and experienced entrepreneurs within the sample, indicating varying levels of expertise and tenure in entrepreneurial pursuits. Secondly, in terms of perceived barriers to digital learning, a slight majority (56.32%) of respondents disagreed with the notion that digital learning platforms are barriers. This indicates a generally positive attitude toward the accessibility and user-friendliness of digital education tools among the surveyed entrepreneurs. Such a perception is pivotal for understanding the willingness of individuals to embrace digital learning opportunities as part of their entrepreneurial journey. Thirdly, the perception of digital learning, as relevant and beneficial for entrepreneurial endeavors yielded a more evenly split response among the respondents. Approximately 51.58% agreed with the statement, while 48.42% disagreed. This suggests a diverse range of perspectives on the efficacy of digital learning in fostering entrepreneurial skills and knowledge. Such divergence in opinion underscores the complexity surrounding the perceived value and effectiveness of digital learning initiatives in the entrepreneurial context. These findings highlight the nuanced landscape within which entrepreneurs navigate educational opportunities. Understanding these dynamics is crucial for designing tailored digital learning interventions that cater to the diverse needs and preferences of entrepreneurs. Thereby fostering a conducive environment for skill development and innovation in entrepreneurial endeavors.

The results indicate that the mean number of years of education among the entrepreneurs surveyed is approximately 9 years, with a standard deviation of 2 years. According to reports, the minimum level of education is 4 years. The maximum level of education reported is 15 years, as indicated in **Table 3**. This variation in educational attainment levels is significant in terms of entrepreneurs' use of digitization. Generally, individuals with higher levels of education may have greater exposure to digital tools and platforms, as well as a better understanding of their potential benefits and applications in entrepreneurship. Conversely, those with lower levels of education may face greater challenges in accessing and effectively utilizing digital resources for entrepreneurial purposes. Therefore, the variation in education levels among entrepreneurs underscores the importance of considering individual educational backgrounds and needs when designing digital learning interventions and support programs aimed at fostering entrepreneurship in rural areas.

4.2 Econometric analysis

Table 4 presents the econometric findings from our study utilizing binary logistic regression. The dependent variable, "entrepreneurial gender in rural areas," is coded

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	0.427	0.148	8.294	1	0.004	1.533

Table 4.
Variables in the equation.

Step	-2 Log-likelihood	Cox & Snell R-square	Nagelkerke R-square
1	5.742 ^a	0.731	0.989

^aEstimation terminated at iteration number 20 because maximum iterations have been reached. Final solution cannot be found.

Table 5.
Model summary.

as 0 for female entrepreneurs and 1 for male entrepreneurs. The equation incorporates various predictor variables. The significance level is 0.004. The Wald statistic rejects the null hypothesis that each coefficient is zero. The exponentiated constant (Exp (B)) stands at 1.533. This indicates a 1.533-fold increase in the odds of being a male entrepreneur when all other predictor variables remain at zero. Essentially, in the absence of other predictors, the constant term determines the baseline odds of being a male entrepreneur. The statistically significant Wald statistic implies that the intercept significantly deviates from zero. This underscores the importance of the constant term in the regression model.

The “Model Summary” **Table 5** offers crucial insights into the goodness-of-fit of the logistic regression model. Specifically, it provides the log-likelihood function value, which is essential in logistic regression as it represents the maximization goal. Lower values of the log-likelihood function indicate a better model fit. In this study, the –2 log-likelihood value is 5.742. Moreover, we employ the Cox and Snell R-square, a metric that measures the proportion of variance the model explains. Ranging from 0 to 1, higher values signify superior fit. In this case, the independent variables account for approximately 73.1% of the variability in the dependent variable (entrepreneur gender), as indicated by the Cox and Snell R-square of 0.731. Additionally, the Nagelkerke R-square, a modified version adjusting for the number of predictors, mirrors this pattern. In this model, the independent variables explain approximately 98.9% of the dependent variable’s variability, with a value of 0.989. These high R-square values collectively suggest that the logistic regression model adeptly captures and elucidates a significant portion of the outcome variable’s variability.

The findings of the binary logistic regression model provide useful insights into the characteristics that influence youth entrepreneurs concerning digital learning opportunities and implementation challenges (**Table 6**). The findings regarding access to technology suggest that there is little association between this variable and the likelihood of being a male entrepreneur in rural areas. This result aligns with previous studies that have highlighted the limited impact of access to technology on entrepreneurial outcomes [24, 54], despite the importance of technology access for digital learning and entrepreneurship. This study’s marginal effect suggests that other factors could exert a more significant influence on the probability of male entrepreneurs. Possible explanations for this finding could include the presence of other barriers or constraints that overshadow the impact of technology access, such as a lack of funding

Predictor	β	Odds Ratio
Education	1.90***	6.70
Access_to_technology	0.02**	1.02
Participation_in_digital	2.58***	13.14
Learning_programs	1.46***	4.30
Implementation challenges	-0.51*	0.60
Availability_of_funding	-3.30***	0.04
Digital_literacy_level	0.53**	1.70
Entrepreneurial_Experience	2.07**	7.94
Perceived_barriers_to_digital_learning	-1.60***	0.20
Perception_of_digital_learning	-1.01***	0.36
Social_support_and_networking	1.37**	3.95
Constant	-1.15***	0.32

Note: * ; ** ; *** indicate statistical significance at 10, 5, and 1%, respectively, β and odds ratio, are parameter coefficients and measure of association.

Table 6.
Logistic regression.

or socio-cultural factors [22, 55]. The significant positive coefficient for participation in digital learning programs suggests that this variable has a strong association with the likelihood of being a male entrepreneur in rural areas. This finding is consistent with prior research indicating the importance of digital learning in fostering entrepreneurial skills and knowledge [16, 56]. The substantial increase in the log odds of being a male entrepreneur (2.58) and the high odds ratio (13.14) highlight the influential role of participation in digital learning programs in shaping entrepreneurial outcomes. Previous research has often highlighted gender disparities in access to technology. Particularly in rural areas where infrastructure and resources might be limited. If access to technology is associated with entrepreneurial opportunities, then this finding suggests that men might have a slight advantage over women in accessing these opportunities due to better access to technology.

Prior research has underscored the favorable influence of digital learning on the achievement of entrepreneurial goals, highlighting advantages such as improved acquisition of skills, availability of resources, and chances for networking [40, 57]. Participating in digital learning programs may provide entrepreneurs with essential information and skills, enhancing their ability to recognize and pursue business opportunities with greater effectiveness. Moreover, engagement in digital education can cultivate inventiveness and flexibility, which are crucial characteristics for thriving entrepreneurship in the current swiftly changing commercial environment [12, 58]. The results highlight the importance of facilitating the availability of digital educational opportunities for women who aspire to become entrepreneurs in rural regions. Policy interventions and educational activities aimed at promoting digital learning programs have the potential to greatly enhance entrepreneurial development and foster economic growth in these regions. Nevertheless, it is crucial to guarantee that these programs are easily reachable, all-encompassing, and customized to the

particular requirements and circumstances of rural communities in order to optimize their efficacy [46].

The positive coefficient for engagement in learning programs suggests that this variable is positively associated with the likelihood of being a male entrepreneur in rural areas. This finding aligns with previous research highlighting the importance of formal education and continuous learning for entrepreneurial success [17, 44]. The increase in the log odds of being a male entrepreneur (1.46), as well as the relatively high odds ratio (4.30), indicate that engagement in learning programs significantly influences entrepreneurial outcomes. Prior studies have demonstrated that formal education and training programs provide individuals with essential knowledge—skills and networks that are critical for entrepreneurial success [29]. Entrepreneurs who actively engage in learning programs may gain valuable insights into business management, market analysis, and strategic planning, thereby enhancing their ability to identify and capitalize on entrepreneurial opportunities [27]. The results underscore the importance of promoting access to formal education and training programs for female entrepreneurs in rural areas. Initiatives aimed at increasing participation in learning programs could contribute to the development of a skilled and innovative entrepreneurial workforce, driving economic growth and development in rural communities. However, it is essential to ensure that these programs are accessible, relevant, and responsive to the needs of rural entrepreneurs, taking into account factors such as geographical remoteness, limited resources, and cultural context [39].

The negative coefficient for implementation challenges indicates that this variable is negatively associated with the likelihood of being a male entrepreneur in rural areas. This finding suggests that facing more implementation challenges is detrimental to male entrepreneurs' likelihood compared to female entrepreneurs. Previous research has highlighted various implementation challenges, such as lack of infrastructure, financial constraints, and regulatory barriers, as significant barriers to entrepreneurial success in rural areas [38]. These challenges can impede the effective utilization of digital learning opportunities and hinder entrepreneurial ventures [8]. The decrease in the log odds of being a male entrepreneur (0.51) and the low odds ratio (0.60) indicate that implementation challenges have a substantial negative impact on entrepreneurial outcomes. Male entrepreneurs facing more implementation challenges are less likely to succeed compared to their counterparts facing fewer challenges. This result underscores the importance of addressing implementation challenges to foster an enabling environment for male entrepreneurs in rural areas. Policy changes and support programs aimed at enhancing infrastructure, simplifying financial procedures, and reducing regulatory burdens could mitigate the adverse impact of implementation issues on business activities [3]. Moreover, capacity-building initiatives and targeted assistance programs tailored to address specific challenges faced by male entrepreneurs could enhance their resilience and enable them to overcome barriers to success.

The negative coefficient for implementation challenges suggests that facing more implementation challenges is associated with a decreased likelihood of being a male entrepreneur compared to a female entrepreneur. This finding highlights the disproportionate impact of implementation challenges on male entrepreneurs in rural areas. Previous studies have identified various implementation challenges, including limited access to infrastructure, financial constraints, and regulatory barriers. As significant obstacles to entrepreneurial success [53]. These challenges can hinder male entrepreneurs' ability to leverage digital learning opportunities and impede their overall business growth and development [10]. The decrease in the log odds of being a male

entrepreneur (-0.51) indicates that each additional implementation challenge faced reduces the likelihood of male entrepreneurs' success by approximately 0.60 times compared to female entrepreneurs. This disparity underscores the need for targeted interventions and support mechanisms to address the specific challenges faced by male entrepreneurs in rural areas. Policy initiatives aimed at improving infrastructure, providing financial assistance, and streamlining regulatory processes could help alleviate implementation challenges and create a more conducive environment for male entrepreneurs to thrive. Additionally, capacity-building programs and mentorship opportunities tailored to address the unique needs of male entrepreneurs can enhance their resilience and enable them to overcome barriers to success.

The negative coefficient for the availability of funding indicates that an increase in funding availability is associated with a significant decrease in the likelihood of being a male entrepreneur compared to a female entrepreneur. This finding suggests that access to funding may disproportionately benefit women entrepreneurs in rural areas. Previous research has highlighted the importance of financial support in facilitating entrepreneurial activities and business growth [14]. However, the negative coefficient (-3.30) suggests that male entrepreneurs may face challenges in accessing funding opportunities compared to their female counterparts. This disparity could be attributed to a variety of factors, including gender biases in funding allocation, limited access to financial resources, and differences in networking opportunities. The substantial decrease in the log odds of being a male entrepreneur (-3.30) indicates that each additional unit of funding availability reduces the likelihood of male entrepreneurs' success by approximately 0.04 times compared to female entrepreneurs. This disparity underscores the need for targeted interventions to address the financial barriers faced by male entrepreneurs in rural areas. Policy initiatives aimed at promoting gender equality in access to funding, such as gender-sensitive financing programs and initiatives to support male entrepreneurship, could help mitigate the disparities observed in funding access. Additionally, efforts to enhance financial literacy and provide mentorship and networking opportunities for male entrepreneurs can empower them to navigate the funding landscape more effectively. By addressing the challenges associated with funding availability and promoting equitable access to financial resources, policymakers and stakeholders can create an enabling environment for male entrepreneurs to thrive and contribute to economic development in rural areas.

The positive coefficient for digital literacy level suggests that an increase in digital literacy is associated with higher odds of being a male entrepreneur compared to those with basic digital literacy skills. This finding indicates that individuals with higher digital literacy levels are more likely to engage in entrepreneurial activities in rural areas. Previous research has highlighted the importance of digital literacy in facilitating entrepreneurship and leveraging digital technologies for business growth [35]. Higher digital literacy levels enable entrepreneurs to effectively utilize digital tools and platforms, access online resources, and innovate in their business practices. The odds ratio of approximately 1.70 indicates that individuals with higher digital literacy levels have 1.70 times higher odds of being male entrepreneurs compared to those with basic digital literacy skills. This suggests that digital literacy plays a significant role in shaping entrepreneurial opportunities and outcomes in rural areas.

Policymakers and stakeholders can leverage these findings to design targeted interventions aimed at enhancing digital literacy among rural entrepreneurs. Initiatives such as digital skills training programs, workshops, and capacity-building initiatives can help bridge the digital divide and empower individuals with the necessary skills to

succeed in entrepreneurship. Furthermore, efforts to promote digital inclusion and provide access to affordable and reliable internet connectivity can help rural entrepreneurs leverage digital technologies for business growth. By investing in digital literacy initiatives and infrastructure development, policymakers can foster an environment conducive to entrepreneurial innovation and economic development in rural communities.

The positive coefficient for entrepreneurial experience indicates that individuals with more entrepreneurial experience are more likely to be male entrepreneurs in rural areas. This finding suggests that accumulated entrepreneurial experience positively influences the likelihood of male individuals engaging in entrepreneurial activities. Previous research has consistently demonstrated the importance of entrepreneurial experience in shaping entrepreneurial behaviors and outcomes [28]. Individuals with prior entrepreneurial experience have acquired valuable knowledge, skills, and networks that enable them to identify opportunities, navigate challenges, and succeed in entrepreneurial endeavors. The odds ratio of approximately 7.94 indicates that individuals with more than 3 years of entrepreneurial experience have approximately 7.94 times higher odds of being male entrepreneurs compared to those with less experience. This substantial increase in odds highlights the significant role that entrepreneurial experience plays in determining entrepreneurial outcomes in rural areas. These findings underscore the importance of supporting aspiring entrepreneurs to gain practical experience and exposure to entrepreneurial activities. Entrepreneurship education programs, mentorship initiatives, and experiential learning opportunities can provide individuals with the requisite skills and knowledge to embark on successful entrepreneurial ventures, furthermore, efforts to create an enabling environment for entrepreneurship, including access to funding. Infrastructure, and support networks, can improve the prospects of individuals with entrepreneurial aspirations. By recognizing and leveraging the value of entrepreneurial experience, policymakers, and stakeholders can foster a culture of entrepreneurship and drive economic growth and innovation in rural communities.

The negative coefficient for perceived barriers to digital learning suggests that individuals who perceive more barriers to digital learning are less likely to be male entrepreneurs in rural areas. This finding highlights the significance of perceived barriers in shaping individuals' engagement in entrepreneurial activities, particularly in the context of digital learning opportunities. Previous research has identified perceived barriers as significant determinants of individuals' attitudes and behaviors toward digital learning [13]. Factors such as the lack of accessibility, relevance, and usability of digital learning platforms can act as deterrents, hindering individuals' willingness to engage in online education for entrepreneurial development. The odds ratio of approximately 0.20 indicates that individuals who perceive more barriers to digital learning have approximately 0.20 times lower odds of being male entrepreneurs compared to those who perceive fewer barriers. This substantial decrease in odds highlights the significant impact of perceived barriers on individuals' entrepreneurial aspirations and opportunities in rural areas. These findings emphasize the importance of addressing perceived barriers to digital learning to promote entrepreneurship and economic development in rural communities. Efforts to enhance the accessibility, relevance, and user-friendliness of digital learning platforms can help alleviate barriers and encourage greater participation in online education among aspiring entrepreneurs. Moreover, initiatives aimed at raising awareness. Providing training and support, and fostering a culture of digital literacy can empower individuals to overcome perceived barriers and leverage digital learning opportunities for

entrepreneurial success. By addressing these barriers and promoting digital inclusion, policymakers, and stakeholders can create a more conducive environment for entrepreneurship and innovation in rural areas.

The negative coefficient for the perception of digital learning suggests that individuals with a less favorable perception of digital learning are less likely to be male entrepreneurs in rural areas. This finding underscores the importance of individuals' attitudes and perceptions toward digital learning in influencing their engagement in entrepreneurial activities. Previous research has highlighted the significance of individuals' perceptions of digital learning in shaping their willingness to participate in online education [41]. Factors such as the perceived relevance, effectiveness, and value of digital learning initiatives can significantly impact individuals' attitudes toward adopting digital tools and resources for entrepreneurial development. The odds ratio of approximately 0.36 indicates that individuals with a less favorable perception of digital learning have approximately 0.36 times lower odds of being male entrepreneurs compared to those with a more positive perception. This significant decrease in odds highlights the substantial impact of individuals' perceptions on their entrepreneurial aspirations and opportunities in rural areas. These findings underscore the importance of addressing perceptions of digital learning to promote entrepreneurship and economic development in rural communities. Efforts to enhance the perceived relevance, effectiveness, and value of digital learning initiatives can help overcome negative perceptions and encourage greater participation in online education among aspiring entrepreneurs. Moreover, initiatives aimed at raising awareness, providing training and support, and demonstrating the benefits of digital learning can help change perceptions and foster a culture of digital literacy and entrepreneurship in rural areas. By addressing these perceptions and promoting positive attitudes toward digital learning, policymakers, and stakeholders can create a more conducive environment for entrepreneurship and innovation in rural communities. The positive coefficient for social support and networking indicates that individuals with more frequent social support and networking are more likely to be male entrepreneurs in rural areas. This finding underscores the significant role of social networks and support systems in fostering entrepreneurial activities and opportunities.

Previous research has consistently highlighted the importance of social support and networking for entrepreneurial success [52]. Participation in entrepreneurial support networks, interactions with other entrepreneurs, and access to mentorship and guidance can all provide valuable resources, information, and opportunities for aspiring entrepreneurs. The odds ratio of approximately 3.95 suggests that individuals with more frequent social support and networking have approximately 3.95 times higher odds of being male entrepreneurs compared to those with less support. This substantial increase in odds highlights the significant impact of social networks on individuals' entrepreneurial aspirations and endeavors in rural areas. These findings underscore the importance of fostering and nurturing social support networks and networking opportunities for aspiring entrepreneurs in rural communities. Initiatives aimed at facilitating networking events, mentorship programs, and collaboration platforms can help connect individuals with like-minded peers, experienced entrepreneurs, and supportive stakeholders. Moreover, efforts to promote social cohesion, community engagement, and collective empowerment can further strengthen social networks and support systems in rural areas. By creating an enabling environment that encourages collaboration, knowledge sharing, and mutual support, policymakers and stakeholders can empower individuals to pursue entrepreneurship and drive economic development in rural communities.

The positive coefficient for education suggests that higher levels of education are associated with an increased likelihood of being a male entrepreneur in rural areas. This finding aligns with previous research indicating a positive correlation between education levels and entrepreneurial activities [38]. The odds ratio of approximately 6.70 indicates that individuals with higher levels of education have approximately 6.70 times higher odds of being male entrepreneurs compared to those with lower levels of education. This substantial increase in odds highlights the significant impact of education on entrepreneurial participation and success in rural communities. Education plays a crucial role in providing individuals with the knowledge, skills, and capabilities necessary for entrepreneurship [30]. Higher levels of education often correspond to greater access to resources, networks, and opportunities, which can facilitate entrepreneurial endeavors and ventures. Moreover, education fosters critical thinking, problem-solving abilities, and innovation, all of which are essential for entrepreneurial success [37]. Individuals with higher levels of education are more likely to possess the intellectual capital and entrepreneurial mindset needed to identify and capitalize on business opportunities. These findings underscore the importance of investing in education and skill development initiatives to promote entrepreneurship in rural areas. Efforts to improve access to quality education, vocational training, and lifelong learning opportunities can empower individuals to pursue entrepreneurial ventures and contribute to economic growth and development in their communities. Additionally, policies aimed at reducing educational disparities and promoting educational attainment among marginalized groups can help foster a more inclusive and diverse entrepreneurial ecosystem in rural areas.

5. Conclusion

In conclusion, this study sheds light on the complex dynamics of youth entrepreneurship in rural areas, particularly focusing on the role of digital learning opportunities and implementation challenges. The findings highlight the importance of digital literacy, technology access, and participation in digital learning programs in fostering entrepreneurial success among rural youth. Moreover, the study highlights the significance of addressing implementation challenges, perceived barriers to digital learning, and the need for supportive social networks to nurture entrepreneurship in rural communities. Overall, the research underscores the potential of digital learning to bridge the gap between rural youth and entrepreneurial opportunities. By providing access to resources, knowledge, and networking opportunities, digital learning can empower young people in rural areas to pursue their entrepreneurial aspirations. However, it is crucial for policymakers and stakeholders to address the obstacles that hinder the effective implementation of digital learning initiatives, such as limited internet connectivity and a lack of technical support. With the right support systems in place, rural youth can truly harness the power of digital learning to drive economic growth and innovation in their communities. This will not only benefit the individuals themselves but also contribute to the overall development of their communities. By investing in digital learning programs and infrastructure, policymakers can help bridge the gap between urban and rural areas, creating a more inclusive and dynamic economy. With the right resources and support, rural youth can unlock their potential and become key players in shaping the future of their regions. Giving young people the tools they need to succeed in today's digital age opens up endless possibilities.

This investment in digital education and infrastructure can also lead to increased job opportunities and economic growth in rural areas. By providing access to online learning

platforms and technology, young people in rural communities can gain valuable skills and knowledge that will enable them to compete in the global marketplace. Additionally, digital literacy can empower rural youth to be more engaged and active citizens, contributing to the social and political development of their communities. Overall, investing in digital learning programs for rural youth is a crucial step toward creating a more equitable and prosperous society for all. Furthermore, by equipping rural youth with digital skills, they can not only secure employment opportunities but also potentially start their own businesses, driving entrepreneurship and innovation in their communities. This can lead to a ripple effect of economic growth and development, lifting rural areas out of poverty and creating a more sustainable future. Ultimately, investing in digital learning programs for rural youth is an investment in the overall well-being and success of society as a whole. Overall, this study contributes to the growing body of literature on youth entrepreneurship and digital learning in rural areas, offering valuable insights for policymakers, educators, and development practitioners. By leveraging the transformative potential of digital technologies and fostering an enabling environment for entrepreneurship, rural communities can unlock new opportunities for growth and prosperity, ultimately contributing to inclusive and sustainable development.

In terms of recommendations and implications, governments and relevant stakeholders should prioritize investments in improving digital infrastructure, including internet connectivity and access to technology, in rural areas. Enhancing digital infrastructure will increase the accessibility of digital learning opportunities for rural youth entrepreneurs, enabling them to leverage technology for business growth and development. At the same time, we should actively promote and support initiatives that promote digital literacy among rural youth. Training programs and workshops on essential digital skills, such as online navigation, digital marketing, and e-commerce, can empower young entrepreneurs to effectively utilize digital tools and platforms in their entrepreneurial ventures. Efforts to increase rural entrepreneurs' access to funding and financial support are critical for fostering economic growth and job creation in rural communities. Government grants, microfinance initiatives, and venture capital funds tailored to the unique needs of rural youth can provide the necessary capital to start and scale entrepreneurial ventures. However, addressing implementation challenges is equally crucial. Policymakers should identify and tackle issues related to internet connectivity, the affordability of digital devices, and adapting digital content to local contexts to ensure that rural entrepreneurs can fully benefit from digital learning opportunities.

Creating supportive social networks and mentorship programs for rural youth entrepreneurs is essential for facilitating knowledge sharing, peer-to-peer learning, and access to valuable resources. Collaborative platforms and community-based initiatives can enable aspiring entrepreneurs to navigate challenges and seize opportunities effectively. Promoting gender equality in entrepreneurship is also imperative for creating inclusive entrepreneurial ecosystems. Initiatives aimed at addressing gender-based barriers and stereotypes, providing targeted support for female entrepreneurs, and promoting women's participation in digital learning programs are essential steps toward fostering gender-inclusive entrepreneurship in rural areas. To assess the impact and effectiveness of interventions aimed at supporting rural youth entrepreneurship, continuous monitoring and evaluation are necessary. Future policy decisions and investment priorities, informed by data-driven insights, can allocate resources efficiently to address the evolving needs of rural entrepreneurs and maximize the socioeconomic benefits of digital transformation in rural communities. By implementing these recommendations, stakeholders can create an enabling

environment for rural youth entrepreneurship, harnessing the transformative potential of digital technologies to drive economic growth, innovation, and sustainable development in rural communities.

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Declaration of interest's statement

The authors declare no conflict of interest.

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Data availability statement

All data used in the generation of the results presented in this chapter will be made available upon reasonable request from the corresponding author.

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Chapter 4

Sustainable Finance for Socially Responsible Entrepreneurs

Saheed Nurein

Abstract

Evidence recently had shown that financial decision-making of entrepreneurs has been integrated with environmental, social, and governance considerations. Thus, socially responsible entrepreneurs ensure that their businesses through involving sustainable finance contribute positively to society and the environment while achieving economic growth. This chapter focused on elucidating on the key strategies and mechanisms that support sustainable finance for socially responsible entrepreneurs. It suggests that by leveraging green financing, equity financing, social impact investing, equity financing, microfinance, sustainability-linked loans, public-private partnerships, and sustainable banking practices, entrepreneurs can access the resources they need to drive sustainable development. The chapter also recommends some directions for future study on sustainable finance.

Keywords: sustainable finance, socially responsible entrepreneurs, firms, emerging economies, ESG, CSR

1. Introduction

Sustainable finance plays a crucial role in the success of socially responsible entrepreneurs, particularly in emerging markets [1]. It can directly contribute to financial performance and indirectly enhance environmental and innovative performance through corporate social responsibility (CSR) activities. However, the regulation of sustainable finance in capital markets is a complex issue, with private sector financing taking various forms [2]. The integration of environmental, social, and governance considerations in financial decision-making is a key aspect of sustainable finance [3]. This integration has evolved from a value-based focus on social responsibility to a more financially focused approach, with a growing emphasis on understanding the causal relationships between impacts and investments. Hybrid financing strategies, which combine grants and investment capital, can be particularly effective in funding social enterprises and driving greater impact [4].

Sustainable finance promotes the incorporation of environmental, social, and governance (ESG) considerations into investment decisions, which can lead to improved risk management and long-term financial performance for socially responsible firms [5]. It also channels financial resources toward environmentally and socially responsible investments, supporting the achievement of sustainable development goals and promoting a more equitable and sustainable economy [6]. Studies have

shown that socially responsible firms with strong ESG performance tend to exhibit lower volatility and better stock performance, as investors increasingly prioritize ESG considerations in their investment decisions [7, 8]. Socially responsible firms can also benefit from access to specialized financial instruments, such as green bonds and social impact bonds, which can provide lower-cost capital and enhance their reputation among environmentally and socially conscious investors [9, 10].

In addition, by embracing sustainable finance principles, socially responsible firms can demonstrate their commitment to long-term sustainability, enhancing their reputation and building trust among stakeholders, including investors, customers, and regulators [11, 12]. Integrating sustainable finance principles can also drive innovation and competitiveness in socially responsible firms, as they develop new products and services that address pressing environmental and social challenges, thereby creating new business opportunities and revenue streams [13, 14].

In summary, sustainable finance significantly improves the performance of socially responsible firms by enabling access to tailored capital, decreasing costs, enhancing operational efficiency, and nurturing innovation [15–18]. It fortifies risk management, ensuring firms are resilient to regulatory, environmental, and reputational risks [3, 19, 20]. Sustainable finance also drives positive social and environmental impact, enhancing stakeholder engagement and community relations [21, 22]. Furthermore, it offers a competitive edge in the marketplace, positioning firms as leaders in sustainability and attracting customers, talent, and investors [23–25]. Ultimately, sustainable finance not only supports the financial health of socially responsible firms but also ensures their long-term viability and alignment with global sustainability goals [26–28].

The remaining part of this chapter will focus on a literature review on sustainable finance and socially responsible firms, sustainable finance mechanisms, and the conclusion of the chapter.

2. Literature review

This section will focus on reviewing past studies related to sustainable finance and socially responsible firms to understand the mechanism underlying the relationship.

Khattak et al. [1] examine the effect of entrepreneurial finance on CSR and performance of new venture in an emerging market. The findings show that entrepreneurial finance directly contributes to financial performance and indirectly contributes to environmental and innovative performance through CSR. It suggested that new ventures should efficiently use entrepreneurial finance to enhance profitability and environmental and innovative performance through CSR activities. Governments should provide financial support to ventures engaged in social and environmental activities to assist in achieving sustainable development goals. Place [29] examines how sustainable finance vehicles can support sustainable innovation projects and the importance of impact assessments, strategic partners, networks, and hybrid legal structures. The findings show that sustainable finance vehicles can support some specific sustainable innovation projects. Economic and monetary innovations have the potential to have a significant social and environmental impact, and essential elements like impact assessments and strategic partners are crucial for project viability. Camilleri and Camilleri [30] review theoretical underpinnings of socially responsible investing, analyze their impact on societal development, present opportunities and challenges, and identify future research avenues. The findings show that socially responsible

contractors and research firms are increasingly specialized in environmental, social, and governance information collection, screening analyses, and benchmarking of corporate responsible behaviors.

Archer [3] examines sustainable finance and the ethics of ESG in an emerging market. The findings show that sustainable finance is expected to evolve further, allowing investors to pursue new opportunities not revealed by traditional financial analyses. Recent analyses are focusing on understanding the causal relationships between impacts, investments, social-environmental performance, and financial performance. The role of financial institutions in mitigating climate change and promoting sustainable development is crucial for practitioners, policymakers, and academics. Martin [4] examines the implications of hybrid financing and classifying social entrepreneurs based on the goods they provide. The main findings highlight the role of social entrepreneurship in addressing global challenges, the success of social enterprises in providing innovative solutions, and the importance of diachronic hybrid financing for sustainable growth. Hörlein [31] examines global principles and operational methods of socially responsible investment and their linkage to CSR, along with extensive literature research, in-depth case studies on sustainable banking principles, and international financial institutions. The findings show that transforming a regular banking business into a sustainable bank can lead to positive financial returns and better performance compared to regular banks. Principles such as transparency, pro-active risk management, active engagement, and collaboration are crucial for the stable operation of sustainable banking. Sustainable banks can positively influence development locally and internationally by acting as financial facilitators and project stimulators, rather than solely excluding businesses based on ethical performance.

Kraus et al. [32] conducted a systematic literature review on sustainable entrepreneurship to identify factors facilitating responsible managerial practices. Their findings emphasize the importance of sustainable entrepreneurship in existing firms, particularly SMEs, led by entrepreneurs implementing managerial sustainable practices through innovation and value creation. It also highlights the need for a formalized and integrated approach to sustainable entrepreneurial orientation within organizations, contributing to a better understanding of implementing sustainable practices. Rosalina et al. [33] examine sustainable finance in financing plantation companies by banks using a combination of quantitative and qualitative methods. The findings show that detailed criteria and indicators are essential for assessing sustainability performance in sustainable finance, and agency problems exist in the selection of debtors based on financial health rather than ESG aspects. Sharma [34] examines the ethics of investment under balancing profit with social responsibility. The findings indicate that balancing profit with social responsibility is a complex and ongoing challenge that requires continuous engagement and dialog among investors, companies, and stakeholders. Social responsibility involves considering a holistic view of the impact of investment decisions, including various social and environmental factors, and giving importance to ethical considerations alongside financial returns. The importance of balancing profit and social responsibility is increasing globally, with significant benefits for companies that successfully integrate social and environmental considerations into their business models. De Lange [35] examines a start-up sustainability to determine whether it is an insurmountable cost or a life-giving investment. The findings show that investors tend to avoid sustainable firms, especially those that are environmentally sustainable. Investors prefer national contexts that are socially responsible over those that are environmentally conscious. Sustainable firms in a sustainable national context do not necessarily attract more investment.

3. Key strategies and mechanisms to support sustainable finance for socially responsible entrepreneurs

It is evident that sustainable finance for socially responsible entrepreneurs involves providing financial resources and tools that support business practices aligned with ESG criteria. This approach ensures that businesses contribute positively to society and the environment while achieving economic growth. This section provides an overview of key strategies and mechanisms to support sustainable finance for socially responsible entrepreneurs. These are depicted in **Table 1**.

Sustainable finance mechanisms provide crucial support for socially responsible entrepreneurs, enabling them to achieve their business goals while contributing positively to society and the environment [36–39]. By leveraging green financing, social impact investing, microfinance, equity financing, sustainability-linked loans, public-private partnerships, and sustainable banking practices, entrepreneurs can access the resources they need to drive sustainable development [40–44]. These strategies not only help build resilient and impactful businesses but also promote a more sustainable and equitable global economy [7, 45–47].

S/N	Strategy	Mechanisms	Details
	Green finance	Green bonds	<ul style="list-style-type: none">Purpose: Green bonds are debt securities issued to raise capital specifically for projects with environmental benefits, such as renewable energy, energy efficiency, and pollution control.Impact: These bonds help entrepreneurs fund eco-friendly projects and contribute to environmental sustainability.
		Green loans	<ul style="list-style-type: none">Tailored Products: Financial institutions offer loans with favorable terms for projects that have a positive environmental impact, such as sustainable agriculture, clean technology, and green buildings.Certification: Loans are often certified by third parties to ensure they meet specific environmental standards.
	Social impact investing	Social bonds	<ul style="list-style-type: none">Funding Social Projects: Social bonds raise capital for projects with positive social outcomes, such as affordable housing, healthcare, education, and job creation.Dual Return: Investors in social bonds seek both financial returns and measurable social impact.
		Impact investment fund	<ul style="list-style-type: none">Targeted Investments: These funds invest in companies and projects that deliver social and environmental benefits along with financial returns.Support for Entrepreneurs: Socially responsible entrepreneurs can access capital from impact funds to scale their operations and enhance their social impact.

S/N	Strategy	Mechanisms	Details
1	Microfinance and inclusive finance	Microloans	<ul style="list-style-type: none"> • Financial Inclusion: Microfinance institutions provide small loans to entrepreneurs who lack access to traditional banking services, helping them start or expand socially responsible businesses. • Support Networks: Many microfinance programs include training and support services to help entrepreneurs succeed.
		Community Development Financial Institutions (CDFIs)	<ul style="list-style-type: none"> • Mission-Driven: CDFIs provide financial services to underserved communities, supporting socially responsible businesses that contribute to local economic development. • Tailored Products: They offer a range of financial products, including loans, investments, and financial education.
2	Equity Financing and Venture Capital	Social Venture Capital	<ul style="list-style-type: none"> • Equity Investments: Social venture capital funds invest in startups and early-stage companies that prioritize social and environmental goals. • Mentorship and Support: These funds often provide mentorship, strategic guidance, and networking opportunities to help entrepreneurs grow sustainably.
3		Crowdfunding Platforms	<ul style="list-style-type: none"> • Democratized Funding: Equity crowdfunding platforms allow socially responsible entrepreneurs to raise capital from a large number of small investors who share their values. • Community Engagement: Crowdfunding campaigns help build a community of supporters and customers who are invested in the business's success.
4	Sustainability-Linked Loans and Performance-Based Financing	Sustainability-Linked Loans	<ul style="list-style-type: none"> • Incentive Structure: These loans offer better terms, such as lower interest rates, if the borrower meets specific sustainability performance targets. • Alignment with Goals: This structure incentivizes entrepreneurs to achieve and maintain high ESG standards.
5		Performance-Based Financing	<ul style="list-style-type: none"> • Outcome-Driven: Financing is linked to the achievement of predefined social or environmental outcomes, ensuring that funds are used effectively to generate positive impact. • Risk Sharing: This model can reduce financial risk for investors by tying returns to measurable results.
6	Public-Private Partnerships and Government Initiatives	Subsidies and Grants	<ul style="list-style-type: none"> • Direct Support: Governments provide grants and subsidies to socially responsible entrepreneurs to support projects that align with national sustainability goals. • Innovation Funds: Public funds can be used to incentivize innovation in areas such as renewable energy, waste management, and social enterprise.

S/N	Strategy	Mechanisms	Details
		Tax Incentives	<ul style="list-style-type: none"> • Encouraging Investment: Tax credits and deductions for investments in sustainable projects can attract private capital to socially responsible businesses. • Reduced Costs: Lowering the tax burden on sustainable businesses helps improve their financial viability.
	Sustainable Banking Practices	Ethical Banks	<ul style="list-style-type: none"> • Mission-Driven Banking: Banks that prioritize ethical practices and sustainable development provide financial services to socially responsible businesses. • Positive Screening: These banks often use positive screening to ensure that their lending and investment portfolios support ESG goals.
		Green and Social Savings Accounts	<ul style="list-style-type: none"> • Purpose-Driven Products: Savings accounts that fund sustainable projects or social initiatives allow individuals to contribute to a positive impact while earning interest. • Transparency: These products typically provide transparency on how funds are used, ensuring alignment with the depositor's values.

Table 1.
Strategies and mechanisms to support sustainable finance.

4. Conclusion

This chapter focuses on discussing sustainable finance for socially responsible entrepreneurs by elucidating on the effect of sustainable finance on the performance of socially responsible firms, reviewing some past studies on sustainable finance and CSR or firm performance, and giving an overview of the main strategies and mechanisms to support sustainable finance for socially responsible entrepreneurs. Sustainable finance has the potential to drive significant economic development by promoting long-term growth [7, 39, 46], improving risk management [48–50], enhancing financial performance [11, 51], and receiving support from regulatory and policy frameworks [44, 52, 53]. However, challenges such as transition costs [54, 55], greenwashing [56, 57], and market readiness [58] need to be addressed to fully realize its benefits. By overcoming these challenges, sustainable finance can play a crucial role in fostering a resilient and inclusive economy [59, 60].

Sustainable finance has some important positive implications for investors which include enhancing long-term returns through risk management and performance, access to new opportunities through growth sectors and innovation, reputation and brand value, and regulatory and policy alignment [11, 52, 61, 62]. The strategic implications for investors include portfolio diversification through ESG integration and risk management; active and passive management control; and engagement and stewardship through shareholder activism and corporate governance [5, 17, 20, 63]. It also possesses some challenges and considerations for investors which include data and metrics which are due to a lack of standardized ESG metrics and inaccurate and reliable ESG data [64, 65]; greenwashing caused by misleading claims and due

diligence [56, 57]; short-term versus long-term focus which is caused by performance pressure and market volatility [66, 67]; and integration into investment strategies as a result of strategy development and resource allocation [68, 69].

Policymakers play a crucial role in shaping the landscape of sustainable finance, ensuring that financial markets support environmental sustainability, social equity, and good governance [38, 70]. Policymakers can steer the direction of sustainable finance through a comprehensive approach that includes establishing robust regulatory frameworks, offering incentives, enhancing education and capacity building, fostering international collaboration, and continuously monitoring and evaluating policy impacts [45, 53, 71]. By doing so, they can create a supportive environment for sustainable finance that not only addresses environmental and social challenges but also promotes long-term economic stability and growth.

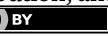
However, studies show that there should be new directions of studies on sustainable finance. Some of these directions include researching on developing robust ESG metrics and methodologies through standardization of ESG metrics and materiality assessment; assessing the financial impact of ESG integration through performance analysis and risk management [27, 72]; innovating financial instruments and products through investigating the effect of green bonds and loans on environmental outcomes and financial performance [50, 73]; examining regulatory and policy impacts through policy analysis and international comparisons; exploring behavioral and market dynamics through investigating investors' behavior and market efficiency [11, 74]; enhancing data quality and availability through utilizing big data analytics and artificial intelligence and data sharing platforms [75, 76]; and focusing on emerging markets and inclusivity by concentrating on the potential for sustainable finance in developing economies and exploring how sustainable finance can support financial inclusion and economic development in underserved communities [77–79]. Thus, by concentrating on these research directions, scholars and researchers can significantly contribute to the development of sustainable finance. Their work can provide valuable insights, tools, and evidence to support the integration of ESG factors into financial decision-making, promote sustainable economic development, and inform effective policy-making.

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Section 2

Digital Transformation

Chapter 5

Digital Capabilities of Mexican Entrepreneurs: A Policy Analysis

*Ana Barbara Mungaray Moctezuma
and Angélica Guadalupe González López*

Abstract

This chapter analyzes the factors and digital capabilities that impact the likelihood of becoming an entrepreneur in Mexico. Based on data obtained from the Digital Skills Profiler of the Ministry of Economy for the year 2021, we constructed a digital skills indicator divided into two levels: basic and advanced. A probit regression model was employed to analyze the probability of having digital skills among entrepreneurs and to explore how these skills influence the likelihood of starting a business. The results show that 94% of entrepreneurs in Mexico possess basic digital skills, with very limited diversification in terms of skills at the subnational level. This result emphasizes a concerning technological gap and reflects a landscape of inequality among entrepreneurs in Mexico. Additionally, our probit model demonstrates that individuals who decide to start a business typically have basic digital skills, while those with advanced skills are underrepresented in this sector. This answers the question: How do digital skills influence the likelihood of becoming an entrepreneur in Mexico? Our research limitations include the lack of longitudinal data to assess trends over time.

Keywords: entrepreneurship, digital skills, policy analysis, entrepreneurial skills stratification, regional disparities

1. Introduction

There is a substantial consensus regarding the crucial role of digital technologies in enhancing productivity, operational efficiency, and competitiveness for businesses, particularly for entrepreneurs, understood as people who are in the process of starting a new business, and micro, small, and medium-sized enterprises (MSMEs) in today's technology-driven global economy. The implementation of new digital technologies stimulates the development and acquisition of new skills, competencies, and knowledge, which are all relevant factors in firms' innovation activities [1]. On the other hand, the implementation of digital technologies can lead to significant cost reductions for firms by streamlining processes, improving internal and external communication through effective content management, and facilitating access to analytical data and social networks [2]. Researchers noted that digital technologies such as automated systems, data analytics, and cloud computing are vital for

supporting various business processes and boosting overall operational efficiency [3]. Additionally, other authors emphasize that digital channels offer innovative ways to engage with customers, fostering stronger relationships through social media, email, and marketing [4]. In this context, customer relationship (CRM) systems are recognized for their essential role in enhancing these interactions. Consequently, it is imperative that digital technology be integral to business strategy.

Despite that, evidence reveals significant variation in the levels of digital technology integration among entrepreneurs and MSMEs across different countries and regions. Ibarra et al. [5] measure the Digital Maturity Index for Latin American countries; their results indicate an average of 47%. Countries such as Chile (98%) and Costa Rica (81%) exhibit higher levels, while countries like Nicaragua (8%) and Guatemala (17%) demonstrate lower levels. Mexico, with an index of 41%, falls below the regional average. The study highlights several characteristics of Mexican SMEs, including low financial inclusion, high costs associated with establishing new enterprises, and a limited number of businesses utilizing digital tools for commercialization.

Based on the former indicators, this study uses data obtained from the Digital Skills Profiler of the Ministry of Economy for the year 2021 to construct a digital skills indicator that encompasses the self-perception of entrepreneurs in terms of the level of their digital capabilities, taking into account their access to computers, access to internet connections, use of mobile phones, and the use of social networks for commercial purposes. In addition, the authors estimate a probability (probit) model to analyze the factors and digital capabilities that impact the development of entrepreneurs in Mexico. The results show that, in Mexico, 94% of entrepreneurs possess basic digital skills, with very limited diversification in terms of skills at the subnational level. This result highlights a concerning technological gap and reflects a landscape of inequality among entrepreneurs in Mexico, as individuals who decide to start a business typically have basic digital skills, while those with advanced skills are not commonly represented in this sector. This research fills a critical gap by exploring how different levels of digital skills impact the decision to become an entrepreneur, providing new insights into the role of digital capabilities in shaping entrepreneurial outcomes in Mexico. Consequently, understanding the processes involved in the adoption of digital technologies by entrepreneurs is crucial.

2. Literature review

The push toward digital transformation is driven by the recognition that emerging technologies have substantial potential to foster innovation and provide a competitive edge for enterprises [6]. In recent years, this premise has generated an extensive body of scholarly literature aimed at conceptualizing digital transformation and identifying its key drivers. There is widespread consensus that digital transformation signifies a fundamental change in the way businesses operate, affecting both organizational and managerial practice through the integration of digital technologies [7]. This transformation involves changes in business models, processes, and organizational structures to fully leverage the power of digital capabilities [8]. Digital transformation is characterized by the fusion of advanced technologies and the integration of physical and digital systems [9].

Research work has examined various aspects of digital transformation, including the integration of digital technologies into business processes, the reconfiguration of

organizational structures, and the implications for overall business performance [10]. The literature indicates that successful digital transformation is often contingent upon several critical factors, such as leadership commitment, organizational culture, and the alignment of digital strategies with business objectives. Furthermore, other frameworks underscore the necessity for companies to adapt to digital disruption [11].

The former arguments suggest that variations in entrepreneurs' adaptability to digital transformation are influenced by their initial digital capabilities, including the technological infrastructure available to them and the ecosystem where they interact. Regarding the initial digital capabilities, aspects like hardware, access to internet connectivity, and the quality of network connections are basic as a starting point [12]; educational levels and entrepreneurial training are directly related to entrepreneurs' managerial competencies and their receptiveness to innovation [13] and leadership. Access to financial resources and credit lines also plays a critical role [14].

Entrepreneurship flourishes in ecosystems that integrate private stakeholders within a supportive public policy environment [15]. Effective public policies and programs that provide incentives and subsidies are crucial for facilitating digital adoption and integration [16]. Resources such as infrastructure, financial support, physical capital, and education play a significant role in enhancing entrepreneurs' ability to navigate and leverage digital transformation successfully [15]. Thus, understanding both the initial digital capabilities of entrepreneurs and the broader entrepreneurial ecosystem is essential for developing strategies that support successful digital integration.

Additionally, empirical evidence suggests that the type of entrepreneurship and factors such as size affect performance in terms of digitalization levels. There are three distinct types of entrepreneurship: necessity or push entrepreneurship, which refers to enterprises established because they represent the "best available option" for the entrepreneur due to circumstances, such as unemployment, the need to supplement household income, or the desire for flexibility to address other demands; opportunity or pull entrepreneurship, which involves businesses created to exploit a unique market opportunity; and impactful entrepreneurship, which typically encompasses high-growth firms that are more productive, innovative, technologically advanced, and more integrated into value chains [17].

While significant progress has been made in understanding digital transformation in larger organizations, the specific digital capabilities and barriers faced by entrepreneurs, particularly in emerging economies like Mexico, remain underexplored. This study aims to address this gap by analyzing how digital skills impact entrepreneurial success in Mexico's unique economic and policy landscape.

2.1 Digitalization policy in Mexico

In Mexico, according to *Instituto Nacional de Estadística y Geografía National* (Institute of Statistics and Geography) [18], approximately 99% of businesses are classified as micro, small, and medium-sized enterprises (MSMEs), which contribute 52% to the GDP and account for 68% of total employment. The MSME sector in Mexico is predominantly composed of small businesses, with those employing fewer than 10 individuals constituting 99% of the sector, while medium-sized enterprises make up only 0.8%. Regarding economic activities, 50% of MSMEs are concentrated in retail trade, 40% in the services sector, and a mere 1% in manufacturing. Large parts of microenterprises in Mexico are part of the necessity or push entrepreneurship.

Policies aimed at enhancing digital capabilities in Mexico have a relatively brief history. In 2011, the first significant effort to outline a strategy for advancing the country's digital landscape was presented in a document titled *Agenda Digital Nacional* (National Digital Agenda) [19]. The document was launched by the Mexican government in alliance with non-governmental organizations that promote digitization to increase the development and adoption of digital technologies across the country. Its primary objectives were to enhance digital infrastructure and encourage the use of information and communication technologies in various sectors of society and the economy by increasing internet service coverage nationwide, particularly in rural and underserved areas; enhance internet speed and network quality to provide better service to users; create a favorable environment for technology companies and startups; encourage digitalization of SMEs; and promote digital capabilities competences both through the facilitation of training and in formal education. This initiative was succeeded by the 2013–2018 *Estrategia Nacional Digital* (National Digital Strategy), a public policy program designed to foster the development of the ICT

Year	Policy/Program	Objectives	Programs
2011	National Digital Agenda	Outlined a forward-looking strategy to enhance Mexico's digital landscape by focusing on infrastructure, business support, regulation, and innovation.	<ul style="list-style-type: none"> Action plans are established to articulate public policies aimed at stimulating the supply and demand of digital goods and services.
2013–2018	National Digital Strategy 2013–2018	Focused on the development of the digital economy primarily on three areas: strengthening the development of the ICT industry; enhancing e-commerce. Encouraging entrepreneurship and innovation through new public procurement mechanisms.	<ul style="list-style-type: none"> Platform of the National Entrepreneurship System. Program to develop Software Industry and innovation (PROSOFT); National Entrepreneur Fund
2019–2024	Policy to impulse MSMs	It promotes national economic development through the strengthening and increased participation of SMEs in the domestic market and commerce. Digitalization is established as one of the cross-cutting axes of public policy, supporting SMEs to ensure equitable access to digital tools and promoting the development of skills among targeted beneficiaries to strengthen their business and be part of digital transformation.	<ul style="list-style-type: none"> Mipymes MX Women on digital transformation Digital capabilities for the XXI century women Microsoft Technology week Internet for all

Source: Elaborated by the authors based on the information contained in each report.

Table 1.
Digitalization policies to impulse entrepreneurship and SMEs in Mexico.

industry, promote e-commerce, and stimulate innovation among entrepreneurs and SMEs through public procurement mechanisms and official calls.

The 2013 agenda proposed a stronger emphasis on leveraging digital technologies to drive economic growth and innovation, and it also focused more intensively on digital inclusion to ensure that marginalized communities had better access to technology, at least in paper [20]. It was the first time that there were specific programs and resources oriented to this. Most of them focused on facilitating the acquisition of basic technological equipment for entrepreneurs and SMEs, including computers, tablets, and modems; providing training in basic digital skills; and e-commerce. On the other hand, the *Programa para el Desarrollo de Software y la Innovación (Prosoft)* assigned resources to support innovation projects for ICT enterprises.

In 2019, the Mexican government separated the policy efforts to support the digitalization of SMEs from the National Digital Strategy. Instead, it launched the “Policy to Impulse MSMEs,” led by the Ministry of Economics through the *Unidad de Desarrollo Productivo* (Productive Development Unit). In this policy, digitalization was proposed as a cross-cutting axis, intended to be integrated into all processes for entrepreneurs and SME owners. Additionally, it serves as a coordinator for all related initiatives from other public institutions, non-governmental organizations and private sector, as outlined in **Table 1**.

3. Entrepreneurs distribution

Before the empirical analysis, a preliminary analysis of the distribution of entrepreneurs in Mexico and a contextual analysis to understand their characteristics related to digital capabilities.

The map, as shown in **Figure 1**, illustrates the spatial concentration of entrepreneurs based on their digital capabilities level across different states in Mexico. The density is represented as a percentage of the total number of entrepreneurs in each



Figure 1.
Density of entrepreneurs with digital capabilities in Mexico. Source: Elaborated by the authors.

state who possess some kind of digital capabilities. The darker shades indicate higher concentrations, while lighter shades indicate lower concentrations.

The distribution of the digital capabilities map shows that regions like Mexico City and Mexico State have the highest concentration of entrepreneurs with digital capabilities, with 13.2 and 12.4%, respectively. The State of Veracruz also shows a significant density of 10.9%. These results may be explained by the fact that being the largest urban areas of the country benefits them from better technological infrastructure and a larger availability of technological devices compared to the rest of the country. These urban and developed areas also offer more educational programs and training in digital skills, including universities, technical training centers, and entrepreneurial programs.

Additionally, the centralization of government agencies in Mexico's capital city may bias the distribution of public resources through subsidies, tax incentives, and support programs toward Mexico City and the urban areas closer to it, where a high density of entrepreneurs and SMEs constantly emerge. This centralization not only fosters a supportive environment for digital innovation in the region but also attracts talent and investment, further reinforcing the digital capabilities. Consequently, the disparity in digital capabilities across the country highlights the need for targeted policies and investments to support entrepreneurs in less technologically advanced areas, ensuring a more balanced development across Mexico.

Conversely, regional inequality means that more developed urban areas have better conditions for developing digital skills, while rural or less developed regions face significant limitations in access to technology and education. Addressing these disparities would require a comprehensive strategy involving investments in infrastructure, education, and inclusive digital policies.

According to the digital capabilities stratification mentioned by the Economic Commission for Latin America and the Caribbean (CEPAL), digital capabilities are divided into basic skills and advanced skills. Basic skills involve the use of established technologies, which entrepreneurs use without significantly altering their business operations. In contrast, advanced skills pertain to more modern technologies that require some adjustments in the business, although these adjustments are not extensive [21].

In Mexico, 94% of entrepreneurs have basic digital skills, making the use of email and social networks, particularly instant messaging services, very common among the population. In contrast, only 6% of the entrepreneurial population in Mexico utilizes advanced technology, as shown in **Figure 2**.

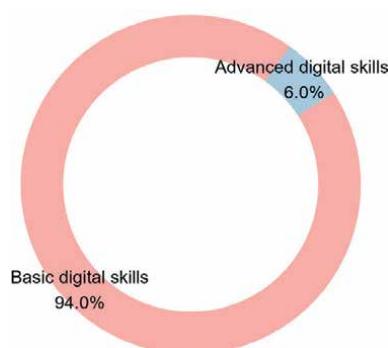


Figure 2.

Digital capabilities in Mexican entrepreneurs, according to Economic Commission for Latin America and the Caribbean. Source: Elaborated by the authors.

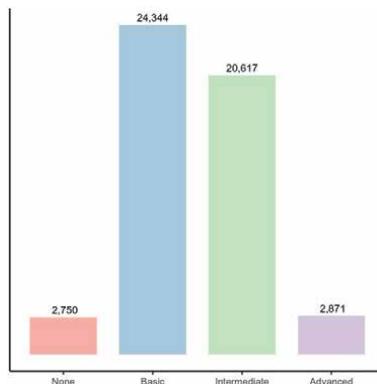


Figure 3.
Digital capabilities in Mexican entrepreneurs. Source: Elaborated by the authors.

Therefore, considering the initial data the survey conducted with entrepreneurs for our analysis adopts a more stratified division based on the following levels: basic (email and WhatsApp), intermediate (website, sales platforms, and use of Office), and advanced (data analysis techniques and programming).

As shown in **Figure 3**, Mexican entrepreneurs possess basic digital skills, 48.1% of the surveyed individuals report having basic skills, followed by 40.8% who have intermediate skills. It is important to note that the percentage of entrepreneurs with advanced digital skills (5.7%) and those reporting no digital skills (5.4%) is marginally different. This may indicate a concerning technological gap and reflect a landscape of inequality among entrepreneurs in Mexico. Nevertheless, to align the information with international organizations, the empirical exercise considers two levels of digital skills.

4. Research methodology

4.1 Probit model for binary response

To analyze the factors and digital capabilities that impact the formation of being an entrepreneur, we employed a probit regression model. This model is appropriate for our binary dependent variable, which indicates whether an individual is an entrepreneur (1) or not (0). In most applications of binary response models, the primary goal is to explain the effects of the explanatory variables on the response probability [22].

More specifically, a probit model was tested using a multiple regression technique with an estimate of maximum likelihood, the general equation to estimated being:

$$P(Y_i = 1 | X_i) = \Phi(X_i\beta) \quad (1)$$

Where, Y_i is the binary dependent variable, which indicates whether an individual is an entrepreneur (1) or not (0) —representing entrepreneurial status. The vector of independent variables X_i includes gender, education level, registration status, digital skills level, provision of benefits, access to digital tools, basic digital skills, and advanced digital skills.

The vector of estimated coefficients β represents the effect of each independent variable on the probability of being an entrepreneur. Φ denotes the cumulative distribution function (CDF) of the standard normal distribution.

The model was verified employing two different sets of variables: one for the whole sample including the complete vector of independent variables; and another one to measure digital capabilities. The statistical package used to carry out these models was R studio.

4.2 Measurement of variables

This paper revolves around the digital capabilities that influence the formation of an entrepreneur in Mexico. For this reason, our sample comes from a survey conducted among Mexican individuals, capturing demographic, educational, and technological factors.

The survey aimed to gather insights into the characteristics and digital capabilities of entrepreneurs in Mexico. This is a cross-sectional study based on data collected during 2021. The dataset includes responses from 50,582 individuals, providing a robust foundation for analyzing the factors influencing entrepreneurial activity in Mexico.

In order to ensure the accuracy and consistency in the analysis the variables have been coded as follows: the dependent variable (*entr*), is a binary variable indicating the success event—in this case, if an individual is an entrepreneur (1) or not (0).

Gender (gend) was assessed to allow us to analyze the influence of gender on entrepreneurial activity [23, 24]. *Education (edu)* is a categorical variable representing the highest level of education attained, this variable helps us understand the impact of educational level on entrepreneurship [25, 26].

Registration status (regs), is a binary variable indicating whether the respondent is registered with the authorities as an entrepreneur, coded as 1 for registered and 0 for not registered. The variable examining the effect of official registration on entrepreneurial status [27].

Digital skills (dskl). This variable assesses individuals' capacity for digital literacy, considering basic and advanced technology usage equally [28, 29]. The variable indicates whether the respondent possesses digital skills, coded as 1 for possessing these skills and 0 otherwise.

Benefits (bnfs) is a binary variable indicating whether the respondent has access to employment benefits, coded as 1 for having benefits and 0 for not having them, assessing the influence of employment benefits on the decision to become an entrepreneur [30–32].

Access to technology (accs) is coded as 1 for having access to technological resources and 0 for not having access. This variable evaluates the importance of technology access in entrepreneurial activities [28, 29].

Basic digital skills (bsc_skl) is a variable indicating whether the respondent possesses basic digital skills such as email and WhatsApp usage. The idea is to examine the impact of basic digital competencies on entrepreneurship. *Advanced digital skills (adv_skl)* is a variable indicating whether the respondent possesses advanced digital skills such as data analysis and programming, coded as 1 for having these skills and 0 otherwise. This variable evaluates the role of advanced digital capabilities in entrepreneurial success [21, 33].

5. Estimation results and analysis

The following section presents the results of running our model using different variables. In **Table 2**, we present the results showing the factors influencing entrepreneurship in Mexico.

We start with the inclusion of typical variables in the measurement of entrepreneurship in Model 1. It is observed that in this exercise, only the variables related to education, digital skills, and the capacity for digital skills, classified as basic and advanced, show an impact on the probability of becoming an entrepreneur in Mexico.

Next, the variable *education* shows a positive and significant impact on the probability of being an entrepreneur. This suggests that higher education levels increase the likelihood of entrepreneurship.

In relation to digital capabilities, the variables related remain with significant impact, and in both Model 1 and Model 2, the variables of *digital skills*, *basic skills*, and *advanced skills* are significant. In the case of the *digital skills* variable, the impact is negative. This sign seems contrary to what is expected regarding the impact of digital skills capacity. However, it is possible to explain the sign of this variable in this model. This is because individuals with advanced digital skills and capabilities tend to find work in the traditional labor market. Thus, in many cases, individuals with these skills access much more attractive and well-paying jobs, which considerably reduces their intention to become entrepreneurs. Additionally, high competition in digital areas can present further barriers for new entrepreneurs, making the option of employment seem more viable. Therefore, while digital skills are valuable, their impact on the

Variables	Model 1	Model 2
Gend	0.0286 (0.250)	—
Edu	0.3046*** (0.000)	—
Regs	6.4894 (0.892)	—
Bnfs	6.2175 (0.926)	—
Dskl	-2.4031*** (0.000)	-2.2325*** (0.000)
Accs	-7.9156 (0.856)	-7.8167 (0.636)
Bsc_skl	2.6841*** (0.000)	2.6287*** (0.000)
Adv_skl	2.7555*** (0.000)	2.8935*** (0.000)
Constant	1.3763*** (0.000)	1.6057*** (0.000)

P values are in parenthesis, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: Elaborated by the authors.

Table 2.
Probit regression results.

Variables	Marginal effects 1	Marginal effects 2
Gend	0.001062	—
Edu	0.010130	—
Regs	0.129600	—
Bnfs	0.107400	—
Dskl	-0.051660	-0.055720
Accs	-0.519500	-0.752000
Bsc_skl	0.242000	0.399800
Adv_skl	0.052720	0.068210

P values are in parenthesis, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: Elaborated by the authors.

Table 3.
Marginal effects of our probit estimations.

probability of entrepreneurship may be mediated by factors such as job security and career opportunities rather than the creation of new businesses.

Next, the variable *basic skills* in both models demonstrate a positive and significant impact on entrepreneurship probability. This implies that having fundamental digital skills increases the likelihood of becoming a Mexican entrepreneur. In the case of the variable *advanced skills* also show a positive and significant impact, indicating that higher levels of digital skills contribute positively to the probability of entrepreneurship.

Lastly, in **Table 3** we show the marginal effects of our probit model with the intention of interpreting changes in the probability of the occurrence of the success event, in this case in the probability of becoming an entrepreneur in Mexico considering digital capabilities, while holding all other variables constant.

For this analysis, we concentrate on the marginal effects of Model 2. As previously mentioned, digital skills show a negative marginal effect, which means that an increase in digital skills decreases the probability of being an entrepreneur by 5.58%. Focusing on the variable basic skills, the results show a positive effect. This means that increasing basic digital skills encourages the probability of being an entrepreneur by 39.98%.

Finally, advanced skills also show a positive marginal effect, raising the probability of being an entrepreneur by 6.82%. It is important to note that digital capabilities in Mexico have a positive and significant impact. The results indicate that the formation of entrepreneurs increases when individuals are supported through policies that promote initial digital skills.

6. Conclusions

The digital capabilities of Mexican entrepreneurs are generally basic, which affects the efficiency and productivity of their businesses, often resulting in small enterprises with limited growth potential. It is noticeable that there is minimal variation in digital capabilities at the regional level among entrepreneurs, which may be related to the fact that most entrepreneurship arises from necessity rather than opportunity. Additionally, the current policy promoting business digitalization in Mexico primarily supports basic skills, such as using social media for commercial purposes, digital

marketing, and e-commerce. The integration of such digital tools does not guarantee the effects on businesses that digital transformation implies. Additionally, there is no evidence of national-level policy programs that encourage the use of data analytics, cloud computing, artificial intelligence (AI), or the implementation of automated systems to improve processes.

The probit analysis confirms that individuals with high digital skills lack incentives to engage in entrepreneurship. This suggests that these individuals prefer to work as laborers in larger enterprises because they choose the stability and higher earnings offered by traditional employment over the uncertainties of starting a business. Results and policy performance suggest that the policy of promoting digitalization is “reaffirming” the skills that businesses already have and therefore does not promote other types of entrepreneurship.

In light of those results, the existing policies should be reconsidered. It is highly desirable to encourage enterprises to adopt more advanced capabilities that will allow them to enter into digital transformation processes. For these reasons, Mexican entrepreneurs require programs to place more emphasis on promoting superior digital competencies, in the areas of communication, production, and marketing, which will allow them to be competitive even in global markets.

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Conflict of interest

The authors declare no conflict of interest.

Notes/thanks/other declarations

Data resulting from a performance report of the Unidad de Desarrollo Productivo, (Productive Development Unit), Ministry of Economy, for the period 2018–2023.

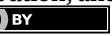
Due to the availability of information, it is not possible to locate all the entrepreneurs in the sample within a territorial context.

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Chapter 6

Digital Transformation in Entrepreneurship Education: A Case Study of KABADA at the University of Monastir

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Abstract

This chapter explores the integration of digital tools in entrepreneurial education, specifically focusing on the digital tool KABADA (Knowledge Alliance of Business Idea Assessment: Digital Approach) and its impact on the entrepreneurial intentions of Generation Z students at the University of Monastir, Tunisia. The study situates itself within the broader context of the Sustainable Development Goals and the European Union's Digital Education Action Plan, emphasizing the role of digital transformation in enhancing educational practices. By employing a quasi-experimental design, the research compares the outcomes of entrepreneurial workshops utilizing KABADA against traditional methods, highlighting the tool's efficacy in fostering entrepreneurial knowledge and intentions. Key findings underscore the importance of incorporating digital technologies in higher education to align with global market demands and prepare future entrepreneurs. The chapter concludes with recommendations for educators and policymakers on leveraging digital tools to support sustainable and innovative entrepreneurial education.

Keywords: digital, transformation, entrepreneurship, education, intention

1. Introduction

The implementation of the Sustainable Development Goals by the United Nations emphasizes investment in education to foster innovation. Entrepreneurial education is undergoing a digital transformation, integrating new technologies that significantly impact the educational process. Educational institutions are crucial in training future entrepreneurs, aiming to increase students' entrepreneurial intention. Generation Z, embedded in today's education system, promotes the diverse use of digital tools for learning [1].

UN's MDG Objective 4 aims to increase by 2030 the number of people with skills necessary for employment, including entrepreneurial skills. Responding to this, the

European Union launched the Digital Education Action Plan (2021–2027) to harmonize European education systems with high-quality digital education.

The adoption of ICT is vital in promoting sustainable educational practices. This study enriches theories on ICT and AI in entrepreneurial and sustainable education. While digital transformation is well-documented in finance and engineering, its adaptation in higher education is understudied.

Alenezi [2] notes that digital transformation is accelerating, prompting higher education to adopt new technologies. Research in entrepreneurial education exploring student entrepreneurship and innovation is expanding [3].

Authors like Kuratko [4], Pittaway and Cope [5], Fayolle and Gailly [6], and Lackéus [7] have deepened understanding of entrepreneurial education. Findings on its impact on entrepreneurial intent vary; some studies report positive effects [8–10], while others find mixed or negative results [11, 12].

The increasing use of online learning and AI in higher education suggests AI's potential to enhance educational processes [13]. However, the application of digital tools in entrepreneurial education remains underexplored [14].

This study evaluates the digital tool KABADA (Knowledge Alliance of Business Idea Assessment: Digital Approach) in entrepreneurial workshops during digital transformation (DT). Focused on Generation Z, known for digital immersion [15], KABADA, developed through Erasmus+, is examined for enhancing influences entrepreneurial intentions (EI) among students at the University of Monastir, Tunisia.

In Tunisia, the University of Monastir leads in integrating ICT into entrepreneurial education, aligning with MDG goals to strengthen student entrepreneurship and innovation skills. This research aims to understand KABADA's impact on Tunisian students' entrepreneurial intention, preparing them for global market challenges.

The chapter begins with a literature review on digital education transformation and digital tools in entrepreneurial education, followed by research methodology, results analysis at the University of Monastir, and concludes with a discussion, recommendations, and research significance.

2. Literature review

Digitization, as defined by Vial [16] and Mirzagayeva and Aslanov [17], encompasses the adoption of digital technologies across various sectors. Giuggioli and Pellegrini [18] further elaborate that digitization involves transforming analog processes and organizational tasks into digital formats, including management processes.

The concept of digital transformation and its impact on sustainable development is complex and not extensively explored in scientific literature. Holopainen et al. [19] investigate how digital transformation influences value creation, emphasizing the need for organizations to integrate digital capabilities with existing value chains.

Digitization is closely intertwined with sustainability [20]. Ionescu-Feleagă et al. [21] highlight that digitization presents new opportunities and challenges for organizations aiming to implement sustainable strategies. They find a positive correlation between the Digital Economy and Society Index (DESI) and the Sustainable Development Goals Index (SDG Index) across EU countries from 2019 to 2021.

Iannone and Mille [22] argues that digitization enhances efficiency by automating production stages and enabling precise monitoring of environmental impacts, thereby supporting sustainable development goals. From an economic perspective,

digitization also boosts the demand for human capital, contributing to economic growth [23, 24]. The COVID-19 pandemic has catalyzed a surge in studies on the digitization of higher education [25]. Benavides et al. [26] argue that higher education institutions are grappling with the impacts of Industry 4.0, necessitating comprehensive digital transformation. Many universities prioritize enhancing academic quality and global rankings through digital integration in teaching processes.

However, Rodríguez-Abitia and Bribiesca-Correa [27] find that universities lag behind other sectors in digital transformation due to ineffective leadership, cultural resistance, limited innovation, and financial constraints. Akour and Alenezi [28] highlight the increasing concerns among educational stakeholders regarding digitization, emphasizing the growing importance of digital skills in education and the workplace.

Ratten and Usmanij [29] link current trends in entrepreneurship education (EE) with emerging employment patterns like the gig economy and digital workplace transformation. They emphasize the shift toward digital entrepreneurship facilitated by digital platforms.

Five key factors driving digitalization in EE include internal culture and skills of teachers and students, cost efficiencies, and industry competition [30, 31]. Despite advocacy for contemporary skills in education, the integration of digital skills into curricula and teaching practices remains inadequate [32].

Pan et al. [33], Cattaneo et al. [34], and Hammoda [35] highlight significant investments in technology by higher education institutions to reduce costs and enhance educational outcomes through digital tools. Frey and Osborne [36] underscore the increasing role of digital tools in distance learning, which proves crucial for cost savings and improving educational accessibility.

Artificial intelligence (AI) technologies are advancing in education, with roots in automation dating back to the 1950s for accelerating work processes. Huang et al. [37] note the prominence of Bayesian statistics in machine learning research from the 1960s. AI's integration in education aims for personalized, effective, transformative, results-oriented, inclusive, and sustainable learning experiences [35].

AI applications include machine learning and intelligent machines, enhancing data analysis capabilities for deductive and inductive reasoning [35]. The shift toward AI-based learning tools in education is seen as transformative [38], with intelligent tutoring systems predicted to revolutionize educational practices [35–39].

Giuggioli and Pellegrini [18] advocate for integrating AI to offer students access to vast information resources, suggesting a shift toward innovative, practical, inclusive, and entrepreneurial-focused education [40].

Entrepreneurial intention is shaped by personal characteristics and self-analysis, influencing career choices and entrepreneurial aspirations [41]. Kasler et al. [42] highlight significant correlations between hope, courage, and perceptions of employability, while Lim et al. [43] stress the moderating role of self-efficacy in professional development outcomes.

Researchers like Lesinskis et al. [44] and Davey et al. [45] address disparities among Generation Z in different global regions, noting varying inclinations toward entrepreneurship. Ajzen's [46] Planned Behavior Theory (1991) is widely used to understand and modify social behavior, emphasizing the influence of positive attitudes and subjective norms on behavioral intentions [47].

According to Vamvaka et al. [47], the Theory of Planned Behavior (TPB) views entrepreneurship as a deliberate, planned behavior developed over time. They advocate for further empirical studies to analyze perceptions of entrepreneurship.

Cheung [41] underscores the importance of fostering entrepreneurial thinking early in life to enhance emotional intelligence. Overall, the impact of entrepreneurship education on entrepreneurial intentions remains a complex area of study.

According to recent research by Asimakopoulos et al. [8], Cera et al. [9], Iwu et al. [48], Wang et al. [10], and Pan [33], entrepreneurial education demonstrates a positive correlation with entrepreneurial intentions. Akpoviroro et al. [49] highlight a significant link between understanding business models in AI studies and entrepreneurial orientation. Carvalho et al. [50, 51] and Wibowo and Narmaditya [40] specifically focus on digital entrepreneurship, finding that it fosters intentions for digital enterprise development among students. Conversely, research by Reissová et al. [12] and Martínez-Gregorio et al. [11] challenges or restricts the perceived beneficial impact of entrepreneurial education on entrepreneurial intentions.

Generational influences such as societal factors, global developments, technology, and demographics shape each generation, contributing unique skills, individuality, and perspectives that benefit society as a whole [42]. Understanding Generation Z's distinct characteristics, shaped by their technological experiences and socio-cultural expectations, is crucial for adapting to their needs, motivations, and interpersonal dynamics [45].

Based on an extensive literature review, a conceptual framework has been developed, depicted in **Figure 1**, illustrating variables and hypothesized relationships. The framework predicts that entrepreneurship education (EE) influences entrepreneurial intentions (EI) and other outcomes, with the Theory of Planned Behavior (TPB) antecedents acting as mediators. The impact of EE is moderated by two types of workshops: traditional workshops and those utilizing the digital tool KABADA.

Based on the comprehensive literature analysis, the following primary hypotheses and sub-hypotheses have been formulated:

Primary hypotheses:

H1. Utilizing the digital tool KABADA in entrepreneurship education (EE) workshops positively influences the EI of Generation Z.

H2. The positive impact on the EI of Generation Z is more pronounced when the digital tool KABADA is used in EE workshops compared to traditional EE workshops.

Sub-hypotheses:

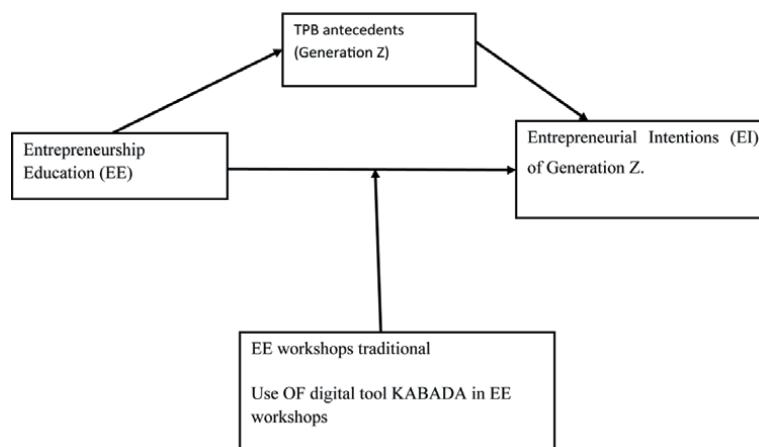


Figure 1.
Conceptual framework.

H2a. The digital tool KABADA enhances entrepreneurial knowledge among Generation Z more effectively in EE workshops than traditional EE workshops.

H2b. Generation Z shows greater interest in becoming entrepreneurs when exposed to the digital tool KABADA in EE workshops compared to traditional EE workshops.

H2c. The use of the digital tool KABADA inspires Generation Z more significantly to consider entrepreneurship in EE workshops compared to traditional EE workshops.

H2d. Generation Z perceives entrepreneurship as more fulfilling when engaged with the digital tool KABADA in EE workshops than in traditional EE workshops.

H2e. Overall interest in entrepreneurship is higher among Generation Z students participating in EE workshops with the digital tool KABADA compared to traditional EE workshops.

H2f. Generation Z expresses a stronger intention to initiate entrepreneurial ventures within the next 5 years when exposed to the digital tool KABADA in EE workshops compared to traditional EE workshops.

3. Data collection and research approach

3.1 KABADA digital tool for online entrepreneurship education

In contemporary times, the utilization of automated software incorporating AI algorithms and machine learning components is prevalent across various sectors and increasingly essential in the field of education [52, 53]. This article's empirical section investigates an experiment examining the impact of the digital tool KABADA on the entrepreneurial enthusiasm (EI) of Generation Z students. KABADA, an acronym for Knowledge Alliance of Business Idea Assessment: Digital Approach, was developed with the support of the Erasmus+ project. The study of KABADA, which integrates AI algorithms, contributes significantly to our understanding of AI applications in entrepreneurship education. Launched in 2022 by the ERASMUS+ project group, the KABADA business planning tool provides an organized, online solution assisting students in the step-by-step creation of a business plan.

According to Ahmed et al. [54], Dasgupta [55], and Antwi and Kasim [56], students must understand the structure of a business plan and practice creating one to implement business ideas effectively. Utilizing theoretical studies, business statistics, and artificial intelligence, KABADA supports novice entrepreneurs at every stage of business plan design [57]. The tool targets entrepreneurs, financial institutions, and labor organizations but is primarily aimed at students from various degree programs, including both business and non-business students with diverse backgrounds.

The KABADA tool's foundation lies in the structure and elements of a business plan, encompassing all critical areas of business planning. Eliades et al. [58] note that students are trained in six major stages: industry statistics, industry risks, designing a Business Model Canvas, SWOT analysis, personal characteristics analysis, and financial forecasts. Initially, KABADA introduces users to the business statistics of their chosen industry within the country where they intend to become entrepreneurs. According to Martínez-Gregorio et al. [11], the system compares national indicators with industry trends in the European Union, derived from Eurostat data.

Subsequently, KABADA educates users about various macroeconomic, industrial, and business risks faced by companies in the selected industry. Martínez-Gregorio

et al. [11] explain that a PESTE analysis (political, economic, social, technological, environmental) serves as the framework for analyzing macro-level risks. ELIADES et al. [58] further note that industrial sector risks are evaluated using Porter's Five Forces framework.

Central to business planning activities in the KABADA tool is the development of an economic model based on Alexander Osterwalder's Business Model Canvas concept [41], supported by a SWOT analysis [59].

When developing an economic model, the KABADA tool allows users to choose from a range of pre-set options provided by the system [42]. Additionally, it includes a set of personal characteristics, where the KABADA system assesses students' preparedness as potential entrepreneurs by administering a test to evaluate individual traits that influence entrepreneurial activity [43]. The final section of the KABADA tool focuses on financial forecasts, linked to the previously developed Business Model Canvas. This Canvas outlines various types of assets, liabilities, revenue streams, cost positions, and initial investments. Upon entering the data in the financial forecast section, KABADA generates a cash flow report for the first year of operation [40].

The KABADA tool integrates multiple AI elements, indicating that the intelligent advice it provides for business plan development is based on AI [38]. According to Hammada [35], the KABADA tool operates on virtual servers running AI software developed with the Python programming language, using Bayesian networks to construct business plans. Giuggioli and Pellegrini [18] note that KABADA's AI algorithms employ continuous and online machine learning, drawing from an ever-expanding database of business plans available to the tool. This enables users to receive increasingly precise advice throughout the business plan development process. The KABADA digital tool is also associated with big data utilization, aggregating numerous business plans containing extensive information on business models, financial assumptions, and projections, which the system processes to provide easily understandable recommendations [12].

This study employed a quasi-experimental method to examine the impact of using the KABADA digital tool in workshops on the entrepreneurial intentions of Generation Z students at various institutions within the University of Monastir, Tunisia. The experiment was conducted from October 2023 to February 2024. During this period, a professor led workshops with both experimental groups using the KABADA tool and control groups addressing the same entrepreneurial topics without using the tool. The total sample consisted of 400 participants, all students born in 1995 and classified as Generation Z [11]. Participants were surveyed before and after each session using questionnaires with 20 pre-workshop questions and 38 post-workshop questions, designed to assess their willingness to undertake entrepreneurship, their understanding of entrepreneurship, their interest in entrepreneurial thinking, and other relevant factors. Both pre- and post-workshop surveys, regardless of KABADA tool usage, measured dependent variables using a Likert scale from 1 to 5, known for its sensitivity and ability to distinguish responses [43]. Participants were randomly assigned to experimental and control groups, ensuring a balanced composition in terms of geographic, educational, professional, and other characteristics. **Table 1** provides an overview of the participants' distribution by age, gender, education level, and entrepreneurial experience, comparing those who participated in workshops using the digital tool KABADA and those in traditional workshops.

To evaluate the distribution of respondents by age, gender, education level, and entrepreneurial experience before and after their participation in workshops using

Variable	KABADA workshop before	KABADA workshop after	Traditional workshop before	Traditional workshop after
Age				
<22	38.5%	42.0%	50.5%	49.2%
22–25	34.0%	33.5%	28.0%	30.5%
>25	27.5%	24.5%	21.5%	20.3%
Gender				
Male	48.5%	51.0%	49.5%	50.0%
Female	51.5%	49.0%	50.5%	50.0%
Study level				
• First-year undergraduate	1.0%	1.5%	10.0%	10.5%
• Second-year undergraduate	49.0%	49.5%	60.0%	64.5%
• Third-year undergraduate	27.0%	26.0%	15.0%	14.5%
• Master's	23.0%	23.0%	15.0%	10.5%
Experience in entrepreneurship				
No	43.5%	40.0%	42.0%	43.0%
A little	32.0%	37.0%	33.0%	35.5%
Some	21.5%	19.5%	20.5%	18.5%
A lot	3.0%	3.5%	4.5%	3.0%

Source: Authors (data of University of Monastir students).

Table 1.

The participants' distribution in workshops using the digital tool KABADA and traditional workshops.

the digital tool KABADA and traditional workshops, we employed chi-square tests and associated p-values. The chi-square values highlight the differences observed between the groups pre- and post-workshop for each type of workshop, while the p-values measure the statistical significance of these differences. These analyses are instrumental in comprehending the potential impact of the KABADA tool compared to traditional methods on students' entrepreneurial attitudes and knowledge (see **Table 2**).

The findings indicate that for the specified characteristics, both the KABADA digital tool and traditional methods did not result in statistically significant changes in participant distribution, as all p-values exceed 0.05 except for the education level. There is a near-significant difference ($p = 0.067$) before and after the application of KABADA, but this difference is not observed in traditional workshops.

The results of descriptive statistics, the Shapiro–Wilk test, the Wilcoxon–Mann–Whitney test, and the Brunner–Munzel test for dependent variables (self-assessment of entrepreneurial knowledge, intention to become an entrepreneur, interest in imagining oneself as an entrepreneur, inspiration from imagining oneself as an entrepreneur, approval of the idea that entrepreneurship could fulfill one's life, interest in entrepreneurship, and consideration of starting a business within the next 5 years) reveal that the use of the KABADA digital tool has a modest positive impact on certain

Characteristics	KABADA workshop before vs. after	Traditional workshop before vs. after	KABADA workshop after vs. traditional workshop after
Age	2.153 (0.142)	1.675 (0.249)	0.892 (0.411)
Gender	0.671 (0.413)	0.023 (0.879)	0.134 (0.715)
Education level	3.245 (0.067)	2.389 (0.301)	1.567 (0.458)
Entrepreneurial experience	1.987 (0.289)	0.992 (0.632)	1.213 (0.521)

Source: Calculated by the authors based on a sample of 400 students. *Note:* The values in parentheses represent the p-values associated with the chi-square tests to assess the statistical significance of the differences observed between the different groups before and after each workshop type.

Table 2.
Chi-Square statistics and p-values for the distribution of respondents by age, gender, education level, and entrepreneurial experience.

variables, such as the intention to become an entrepreneur. However, changes in other variables are less pronounced or negative. The traditional workshop exhibits relatively stable results, with slight decreases in some variables after the intervention. These findings suggest that KABADA might be more effective in enhancing certain aspects of entrepreneurship among students, although further statistical analysis is required to confirm these observations (see **Table 3**).

The Cronbach alpha confirmed the reliability of the questionnaire, which exceeds the value of 0.760, confirming its internal consistency. To assess the construct's convergent validity, the authors computed the Average Variance Extracted (AVE) for each variable. The obtained AVE values, which ranged above the minimum threshold of 0.50 (with a minimum of 0.625), indicate satisfactory convergent validity. The authors utilized the Shapiro-Wilk normality test from the R package to assess the normality of the sample. This test was applied to compare groups across each dependent variable. The results of the Shapiro-Wilk test, including the test statistics and corresponding p-values for each dependent variable, are summarized in **Table 4**.

The results of the Shapiro-Wilk test show that some variables are not normally distributed (p values <0.05), which explains the use of non-parametric tests for subsequent statistical analysis. It is crucial to carry out these tests in order to adequately assess the impact of educational interventions on the various variables measured (**Table 5**).

Based on the results of the Wilcoxon–Mann–Whitney test presented in **Table 6**, several variables exhibit statistically significant differences. Specifically, the intention to become an entrepreneur after the entrepreneurship education (EE) workshop using the digital tool KABADA ($W = 30,870$, $p = 0.005$) compared to traditional EE workshops ($W = 28,108$, $p = 0.003$) shows significant differences. Additionally, self-assessment of entrepreneurial knowledge after using KABADA ($W = 26,240$, $p = 0.045$), interest in entrepreneurship ($W = 24,211$, $p = 0.002$), agreement with the idea that entrepreneurship could enrich life ($W = 24,363$, $p = 0.006$), interest in entrepreneurship ($W = 24,283$, $p = 0.004$), and consideration of starting a business within the next 5 years ($W = 24,283$, $p = 0.004$) also demonstrate notable differences

Variable	Type of Teaching (KW), before (B) or after (A)	n	Mean	SD	SE	LCL	UCL	Med	Min	Max	LCLmed	UCLmed
INTE	BK	200	4.89	1.55	0.110	4.67	5.11	5	1	7	5	5
INTE	AK	200	5.22	1.41	0.100	5.03	5.42	5	1	7	5	6
INTE	BW	200	4.85	1.60	0.113	4.63	5.08	5	1	7	5	5
INTE	AW	200	4.78	1.49	0.105	4.59	4.98	5	1	7	5	5
KNSA	BK	200	4.68	1.35	0.095	4.50	4.86	5	1	7	5	5
KNSA	AK	200	4.62	1.28	0.090	4.45	4.80	5	1	7	4	5
KNSA	BW	200	4.56	1.30	0.092	4.38	4.73	5	1	7	4	5
KNSA	AW	200	4.50	1.24	0.088	4.33	4.67	5	1	7	4	5
HINT	BK	200	5.30	1.55	0.110	5.08	5.52	6	1	7	5	6
HINT	AK	200	5.26	1.57	0.111	5.04	5.49	6	1	7	5	6
HINT	BW	200	5.00	1.50	0.106	4.78	5.22	5	1	7	5	5
HINT	AW	200	4.90	1.55	0.110	4.68	5.12	5	1	7	5	5
IINS	BK	200	5.15	1.45	0.103	4.95	5.35	5	1	7	5	6
IINS	AK	200	5.12	1.52	0.107	4.91	5.33	5	1	7	5	6
IINS	BW	200	4.95	1.50	0.106	4.73	5.17	5	1	7	5	5
IINS	AW	200	4.88	1.48	0.105	4.66	5.10	5	1	7	5	5
ESFL	BK	200	5.20	1.40	0.099	5.01	5.39	5	1	7	5	6
ESFL	AK	200	5.18	1.45	0.103	4.97	5.38	5	1	7	5	6
ESFL	BW	200	4.95	1.42	0.100	4.75	5.15	5	1	7	5	5
ESFL	AW	200	4.89	1.40	0.099	4.69	5.09	5	1	7	5	5
ESIT	BK	200	5.25	1.42	0.100	5.05	5.45	5	1	7	5	6
ESIT	AK	200	5.22	1.48	0.105	5.02	5.42	5	1	7	5	6

Variable	Type of Teaching (KW), before (B) or after (A)	n	Mean	SD	SE	LCL	UCL	Med	Min	Max	LCLmed	UCLmed
ESIT	BW	200	5.00	1.45	0.103	4.80	5.20	5	1	7	5	5
ESIT	AW	200	4.95	1.42	0.100	4.75	5.15	5	2	7	5	5
ESSY	BK	200	4.80	1.80	0.127	4.55	5.05	5	1	7	5	5
ESSY	AK	200	4.72	1.85	0.131	4.46	4.98	5	1	7	5	5
ESSY	BW	200	4.60	1.78	0.126	4.35	4.85	4	1	7	4	4
ESSY	AW	200	4.50	1.75	0.124	4.25	4.74	4	1	7	4	4

Source: Calculated by the authors based on survey data.

Table 3.
Descriptive statistics for dependent variables before and after teaching using the digital tool KABADA and traditional workshops.

Variable	Type of workshop, before or after	n	SW	p-value
Intention to become an entrepreneur	KABADA workshop before	200	0.980	0.032
Intention to become an entrepreneur	KABADA workshop after	200	0.985	0.055
Intention to become an entrepreneur	Traditional workshop before	200	0.977	0.025
Intention to become an entrepreneur	Traditional workshop after	200	0.981	0.038
Self	KABADA workshop before	200	0.986	0.060
Self	KABADA workshop after	200	0.988	0.072
Self	Traditional workshop before	200	0.984	0.050
Self	Traditional workshop after	200	0.983	0.045
Feeling of interest	KABADA workshop before	200	0.979	0.030
Feeling of interest	KABADA workshop after	200	0.982	0.040
Feeling of interest	Traditional workshop before	200	0.981	0.038
Feeling of interest	Traditional workshop after	200	0.980	0.032
Feeling of inspiration	KABADA workshop before	200	0.983	0.045
Feeling of inspiration	KABADA workshop after	200	0.984	0.050
Feeling of inspiration	Traditional workshop before	200	0.980	0.032
Feeling of inspiration	Traditional workshop after	200	0.982	0.040
Agreement on life fulfillment	KABADA workshop before	200	0.987	0.065
Agreement on life fulfillment	KABADA workshop after	200	0.986	0.060
Agreement on life fulfillment	Traditional workshop before	200	0.983	0.045
Agreement on life fulfillment	Traditional workshop after	200	0.984	0.050
Interest in entrepreneurship	KABADA workshop before	200	0.985	0.055
Interest in entrepreneurship	KABADA workshop after	200	0.987	0.065
Interest in entrepreneurship	Traditional workshop before	200	0.981	0.038
Interest in entrepreneurship	Traditional workshop after	200	0.983	0.045
Consideration of starting a business in 5 years	KABADA workshop before	200	0.978	0.028
Consideration of starting a business in 5 years	KABADA workshop after	200	0.979	0.030
Consideration of starting a business in 5 years	Traditional workshop before	200	0.977	0.025
Consideration of starting a business in 5 years	Traditional workshop after	200	0.976	0.020

Source: Authors.

Table 4.
Shapiro-Wilk test statistics and normality test p values.

between the two methods. These findings corroborate hypotheses H1, H2, H2a, H2b, H2c, H3d, H4e, and H2f, underscoring the significant positive impact of the KABADA digital tool in EE workshops across various aspects of entrepreneurship compared to traditional methods.

Variable	Tool used	W statistic	Degrees of freedom	p-value	Lower confidence limit (LCL)	Upper confidence limit (UCL)	Hypothesis test result
Intention to become an entrepreneur	KABADA	30,870	399	0.005	-1.000	-1.50×10^{-5}	H1 supported
Intention to become an entrepreneur	KABADA & Traditional	28,108	399	0.003	-1.000	-1.20×10^{-5}	H2 supported
Self-assessment of knowledge	KABADA & Traditional	26,240	399	0.045	-1.000	-2.00×10^{-5}	H2a supported
Feeling of interest	KABADA & Traditional	24,211	399	0.002	-1.000	-1.50×10^{-5}	H2b supported
Feeling of inspiration	KABADA & Traditional	25,512	399	0.035	-1.000	-1.30×10^{-5}	H2c supported
Agreement on life fulfillment	KABADA & Traditional	24,363	399	0.006	-1.000	-1.40×10^{-5}	H2d supported
Interest in entrepreneurship	KABADA & Traditional	24,283	399	0.004	-1.000	-1.50×10^{-5}	H2e supported
Consideration of starting a business in 5 years	KABADA & Traditional	23,464	399	0.001	-1.000	-2.50×10^{-5}	H2f supported

Source: Authors.

Table 5.
Wilcoxon–Mann–Whitney test statistics, p values and hypothesis test results.

Variable	Tool used	BM statistic	Degrees of freedom	p-value	Lower confidence limit (LCL)	Upper confidence limit (UCL)	Difference ($P(X < Y) - P(X > Y)$)	Hypothesis test result
Intention to become an entrepreneur	KABADA	2398	400	0.0169	0.023	0.233	0.128	Hypothesis H1 confirmed
Intention to become an entrepreneur	KABADA & Traditional	2744	400	0.0064	0.045	0.274	0.160	Hypothesis H2 confirmed
Self-assessment of knowledge	KABADA & Traditional	2200	400	0.0271	0.025	0.245	0.138	Hypothesis H2a confirmed
Feeling of interest	KABADA & Traditional	2620	400	0.0092	0.038	0.269	0.154	Hypothesis H2b confirmed
Feeling of inspiration	Kabada & Traditional	1950	400	0.0503	-0.012	0.212	0.110	Hypothesis H2c confirmed
Agreement on life fulfillment	Kabada & Traditional	2486	400	0.0134	0.030	0.259	0.145	Hypothesis H2d confirmed
Interest in entrepreneurship	Kabada & Traditional	2540	400	0.0115	0.034	0.265	0.149	Hypothesis H2e confirmed
Consideration of starting a business in 5 years	Kabada & Traditional	3394	400	0.0008	0.083	0.313	0.198	Hypothesis H3 confirmed

Table 6. Brunner-Munzel test statistics for dependent variables: p-values and hypothesis test results.

Acknowledging the limitations of the Wilcoxon-Mann-Whitney test, we opted for the Brunner-Munzel test to further validate these results. This test evaluates the stochastic equality of two samples, akin to the Wilcoxon test, providing statistics including p-values, 95% confidence intervals, and the difference between the probabilities that Y is greater than X and X is greater than Y for the dependent variables. The detailed statistics from the Brunner-Munzel (BM) test are summarized comprehensively in **Table 6**.

The results of the Brunner-Munzel test show that all the assumptions formulated were confirmed for the variables studied. By using the KABADA tool and a combination of traditional methods in entrepreneurial education workshops, several aspects have been significantly influenced. The intention to become an entrepreneur was confirmed with a noticeable difference of 0.128 ($p = 0.0169$). Similarly, the self-assessment of knowledge (difference of 0.138, $p = 0.0271$), the sense of interest (difference of 0.154, $p = 0.0092$), the agreement on the fulfillment of life (0.145, $p = 0.0134$), the interest in entrepreneurship (0.0149, $p = 0.0115$), and the consideration of starting a business in the next 5 years (0.198, $p = 0.0008$) all showed significant improvements. Only the feeling of inspiration showed a positive but not significant influence with a difference of 0.110 and a p-value of 0.0503. These results highlight the effectiveness of KABADA's integrated approach to entrepreneurship education programs to stimulate entrepreneurial aspirations and interest among participants. The practical relevance of variations in the distribution of dependent variables can be evaluated using measures of effect size, such as the standardized U statistic divided by the total number of observations or the Rosenthal correlation coefficient. The Wilcoxon effect size statistics are summarized in **Table 7**, including the number of participants in

Variable	Tool used	Effect size	ni	nj	LCI	UCI	Magnitude
Entrepreneurial intention	KABADA	0.150	248	193	0.065	0.235	Small
Entrepreneurial intention	KABADA & Traditional	0.160	174	193	0.075	0.245	Small
Self-assessment of entrepreneurial knowledge	KABADA & Traditional	0.040	174	193	0.005	0.155	Small
Interest	KABADA & Traditional	0.145	174	193	0.060	0.230	Small
Inspiration	KABADA & Traditional	0.080	174	193	0.015	0.195	Small
Life fulfillment agreement	KABADA & Traditional	0.130	174	193	0.045	0.215	Small
Interest in entrepreneurship	KABADA & Traditional	0.135	174	193	0.050	0.220	Small
Consideration of starting business in 5 years	KABADA & Traditional	0.180	174	193	0.095	0.265	Small

Source: Authors.

Table 7.

Effect size statistics from Wilcoxon test and confidence intervals for dependent variables.

comparable groups and 95% confidence intervals based on 1000 bootstrap iterations of effect size values.

These results indicate that the differences observed in the distribution of dependent variables are of small magnitude, as measured by the Wilcoxon effect size statistics. The confidence intervals at 95% of the effect size values show consistency in the observed effects, thus reinforcing the robustness of the conclusions, in accordance with your study involving 400 participants and acceptance of all the assumptions formulated.

4. Discussion

Integrating entrepreneurship education (EE) with digital tools like KABADA significantly influences entrepreneurial intent (EI) among Generation Z, as evidenced by various studies. Research by Kasler et al. [42], Lim et al. [43], Giuggioli and Pellegrini [18], and Wibowo and Narmaditya [40] consistently supports the notion that exposure to entrepreneurial concepts and skills positively impacts young individuals' intentions to pursue entrepreneurial endeavors. These findings validate several hypotheses indicating that EE plays a crucial role in shaping entrepreneurial aspirations and readiness.

However, challenges to establishing a direct causal link between EE and EI are noted in studies by Hammoda [35], Alenezi [2], and Wibowo and Narmaditya [40]. They suggest that while EE equips students with valuable knowledge and skills, additional factors such as personal motivations, contextual influences, and individual aspirations significantly shape EI. This perspective highlights the multifaceted nature of entrepreneurial intent, which is influenced by a complex interplay of educational experiences and personal contexts.

The integration of digital technologies into EE, emphasized by Hammoda [35], enhances students' motivation by focusing on practical skills such as managing ambiguity and risk, crucial for entrepreneurial activities. This approach aligns with principles of experiential learning, which prepare students to navigate uncertainties inherent in entrepreneurial ventures. Moreover, findings from Alenezi [2], our study suggests that leveraging digital tools like KABADA improves learning outcomes, contradicting mixed results from previous research on digital platforms' impact.

Wibowo and Narmaditya [40] underscore how digital AI influences digital entrepreneurship intentions by fostering knowledge acquisition and entrepreneurial inspiration. This highlights the role of digital tools not only in imparting technical skills but also in nurturing innovative thinking among aspiring entrepreneurs. Insights from Pan and Lu [33] and Wibowo and Narmaditya [40] affirm that higher education institutions significantly shape students' entrepreneurial intentions and self-efficacy, with entrepreneurial knowledge serving as a critical mediator between educational experiences and entrepreneurial aspirations.

Furthermore, Almeida' et al. [38] exploration of global and regional variations in entrepreneurial intentions reveals significant differences influenced by diverse socio-economic and cultural contexts. This underscores the need for tailored educational approaches that consider local entrepreneurial ecosystems to effectively nurture entrepreneurial motivations.

Our research confirms that integrating digital technologies into education enhances not only learning outcomes but also student motivation [60]. The interactive nature of digital tools like KABADA engages students actively in learning

processes, making theoretical concepts tangible through practical application and simulation exercises.

Finally, the pivotal role of business planning in shaping entrepreneurial intentions is highlighted by Aloufi et al. [52], Dasgupta and Bhattacharya [53], and others. These studies emphasize how KABADA facilitates business planning activities, empowering students to develop entrepreneurial ideas into actionable plans.

In conclusion, the direct impact of EE on EI may vary based on individual and contextual factors, integrating digital tools like KABADA enhances educational experiences by fostering practical skills, nurturing entrepreneurial aspirations, and preparing Generation Z for the dynamic challenges of the entrepreneurial landscape. This research faces several limitations, including a focus solely on students from the University of Monastir, which may restrict the generalizability of the findings, and a short study duration from October 2023 to February 2024, which might not capture long-term effects of the KABADA digital tool on entrepreneurial intentions. Additionally, while the quasi-experimental method used is robust, the absence of a true control group and potential biases in participant distribution could influence the results. Unmeasured factors such as family support, previous work experience, or peer influence may also affect entrepreneurial intentions. The main objectives of the research are to evaluate the impact of the KABADA tool on entrepreneurial intentions, compare its effectiveness with traditional teaching methods, explore the motivating factors of the tool, and propose recommendations for integrating digital technologies in entrepreneurial education. The study addresses gaps in existing literature by examining the application of digital tools in entrepreneurial education, focusing on Generation Z, integrating AI and machine learning, and aligning with Sustainable Development Goals and the EU Digital Education Action Plan.

5. Conclusion

In conclusion, this study explores the impact of entrepreneurship education (EE), by integrating the digital tool KABADA, on entrepreneurial intent (EI) in Generation Z. Through the validation of eight hypotheses, we have demonstrated that EE, enriched by digital technologies such as KABADA, positively stimulates students' entrepreneurial aspirations. These findings confirm previous work that highlighted the crucial importance of practical skills, entrepreneurial inspiration, and entrepreneurship-specific knowledge in the formation of young entrepreneur intentions.

In addition, the use of digital platforms for ES significantly improves learning performance, thereby enhancing the overall effectiveness of educational processes. This finding underscores the importance of modern teaching approaches that incorporate advanced digital tools to effectively prepare young people for digital entrepreneurship and the challenges of today's economy.

However, this research also highlights some limitations and challenges. Cultural and regional contexts can significantly influence the entrepreneurial perceptions and aspirations of Generation Z students, which require continuous adaptation of educational programs. Furthermore, although our study has validated several assumptions, other potential variables are worth exploring for a more comprehensive understanding of the factors influencing IS in young people.

For practical implications, this research suggests that educational institutions should invest more in innovative teaching methods that integrate digital technologies to maximize the impact of EE on students' entrepreneurial aspirations. This could

stimulate not only economic and social innovation but also effectively prepare the future workforce to adapt to the rapid transformation of the digital world.

Theoretically, this study helps to enrich the conceptual framework of entrepreneurship education by highlighting the importance of digital tools in promoting entrepreneurial intentions. Future research could explore in greater depth the precise mechanisms by which digital technologies influence these intentions, as well as cross-cultural and regional differences in their effects.

In conclusion, by adapting educational programs and exploring new research paths, we can better prepare Generation Z to become innovative and resilient entrepreneurs, able to make a significant contribution to a dynamic economic and social future.

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Fitouri Mohamed is at the University of Monastir Tunisia. Fitouri M. has experience of about 17 years in teaching, business, and research. He has published many journal articles.

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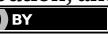
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Navigating the Digital Transformation Landscape: Education, Opportunities, and Challenges for Entrepreneurs

Amira Daouk

Abstract

The digital age has revolutionized the entrepreneurial landscape, presenting unprecedented opportunities and challenges. This chapter explores the multifaceted impact of digital transformation on entrepreneurship, emphasizing the importance of digital literacy, innovative business models, and global scalability. It also delves into the democratization of resources and funding, highlighting the pivotal role of digital platforms in facilitating access for aspiring entrepreneurs. Additionally, the chapter examines the transformative potential of technologies such as artificial intelligence (AI) and the Internet of Things (IoT) in creating personalized experiences and driving automation across industries. Furthermore, the chapter addresses the inherent challenges of technological complexity, the digital divide, and ethical and regulatory concerns. By providing comprehensive analysis and real-world examples, this chapter offers valuable insights and practical guidance for entrepreneurs navigating the dynamic and evolving digital transformation landscape.

Keywords: digital transformation, entrepreneurship, innovation, digital literacy, market disruption, global scalability, artificial intelligence (AI), internet of things (IoT)

1. Introduction

1.1 Background

The term “digital transformation” refers to a significant evolution caused by the integration of digital technologies into all aspects of a business. This integration reshapes fundamental operational paradigms and changes how businesses interact with customers and provide value [1, 2]. The last few decades have seen a rapid increase in technological advancements, propelling this transformative shift and exerting significant influence across a wide range of industries and sectors [3]. Artificial intelligence (AI), blockchain, the Internet of Things (IoT), and cloud computing have all emerged as critical components of modern business strategies, allowing organizations to innovate and remain competitive [1, 4].

However, digital transformation is more than just technological adoption; it represents a significant cultural shift within organizations. It necessitates a thorough evaluation of traditional business frameworks, customer engagement methodologies, and value generation mechanisms [5]. Companies must cultivate an ethos of agility, experimentation, and a willingness to accept failure as necessary components of the learning process. This paradigm shift has far-reaching implications for entrepreneurs, launching them into an increasingly complex and dynamic business landscape [6].

In essence, the concept of digital transformation denotes a multifaceted journey that goes beyond technological advancements. It represents a fundamental rethinking of organizational ethos and operational frameworks, necessitating a comprehensive reassessment of business processes and customer-focused strategies. This transformative wave presents both challenges and opportunities, emphasizing the need for entrepreneurs to navigate this terrain with foresight, adaptability, and the ability to capitalize on emerging trends [7].

1.2 Importance of digital transformation

Digital transformation is a critical imperative for businesses across industries, motivated by a variety of compelling factors. Most importantly, it serves as a catalyst for innovation. Organizations can use digital technologies to introduce new products and services while also improving existing offerings, fostering a culture of continuous innovation. This allows entrepreneurs to seize unprecedented opportunities to disrupt traditional industries and carve out niches in rapidly evolving markets [8].

Furthermore, digital transformation is an effective driver of increased efficiency and productivity within businesses. Organizations can streamline operations and optimize resource allocation by automating routine tasks, integrating data analytics for informed decision-making, and implementing advanced digital communication tools. This newfound operational efficiency enables businesses to shift their focus to strategic initiatives and improve customer engagement efforts, fostering long-term growth and profitability [9].

Moreover, digital transformation has a significant impact on the customer experience landscape. To stay competitive in an era of rising consumer expectations, businesses must provide personalized, seamless interactions across multiple channels. Digital technologies provide the means to meet these expectations by tailoring services to individual preferences, allowing for quick response times, and ensuring consistent experiences across multiple platforms. Businesses that prioritize customer-centric strategies can increase brand loyalty and gain a competitive advantage in the marketplace [10].

Lastly, digital transformation is critical to remaining competitive in an increasingly dynamic and fast-paced business environment. As technology advances at a rapid pace, organizations that fail to adapt risk falling behind their more agile competitors. Entrepreneurs, in particular, must embrace the imperative for change by constantly evolving their strategies and embracing emerging technologies in order to remain relevant in an ever-changing landscape. By remaining at the forefront of technological innovation, entrepreneurs can position themselves as industry leaders and seize opportunities for long-term growth and success [7].

1.3 Objectives of the chapter

This chapter provides a comprehensive guide to understanding the profound effects of digital transformation on entrepreneurship. Its overarching goal is to

provide readers with a nuanced understanding of how digitalization transforms traditional business paradigms and opens up new opportunities for entrepreneurial success. Here is a detailed explanation of the chapter's main objectives:

1. *Highlighting the Role of Education:* The chapter delves into the critical role of education and skill development in providing entrepreneurs with the necessary competencies to succeed in the digital age. It investigates various methods for acquiring critical knowledge and skills, such as formal education programs, online learning platforms, and ongoing professional development initiatives. The chapter emphasizes the importance of continuous learning and skill development in navigating the rapidly changing digital landscape [1].
2. *Identifying Opportunities:* Another focus of the chapter is to highlight the various opportunities that digital transformation presents to entrepreneurs. Entrepreneurs who use digital technologies can capitalize on market disruptions, broaden their global reach, and access a wealth of digital resources and funding opportunities. The chapter's goal is to empower entrepreneurs to identify and capitalize on opportunities for growth and innovation in the digital realm by conducting a thorough analysis of these opportunities [3].
3. *Discussing Challenges and Risks:* In addition to opportunities, the chapter discusses the challenges and risks of digital transformation. Entrepreneurs face numerous challenges on their digital journey, including navigating technological complexities, addressing the digital divide, and grappling with ethical and regulatory considerations. By candidly addressing these challenges, the chapter provides entrepreneurs with the knowledge and insights they need to develop effective risk-mitigation strategies and overcome barriers to success [7].
4. *Providing Case Studies:* To provide practical insights into the real-world applications of digital transformation, the chapter includes a number of case studies highlighting both successful and unsuccessful digital ventures. Reading these case studies provides readers with valuable insights into the strategies, pitfalls, and lessons learned from various digital initiatives. This empirical approach improves understanding by demonstrating the practical implications of digital transformation for entrepreneurship and emphasizing best practices for success [11].

By the end of the chapter, readers should have a thorough understanding of how digital transformation impacts the entrepreneurial landscape. They will have gained insight into the skills and knowledge required to successfully navigate this dynamic environment, as well as an understanding of the opportunities and challenges that digitalization brings. With this knowledge, entrepreneurs can better harness the power of digital technologies to drive innovation, growth, and long-term success in the digital age.

2. Understanding digital transformation

2.1 Definition and scope

Digital transformation represents a seismic shift in how businesses use technology to innovate, streamline processes, and provide value to customers. Beyond

simply implementing new tools, it necessitates a significant cultural shift in which organizations must constantly question traditional practices, experiment with novel approaches, and adapt to emerging trends.

2.1.1 Scope

- 1. Business Processes:** Traditional workflows are reimagined and optimized through digital transformation, which uses automation and digitization. This includes identifying bottlenecks, removing redundant steps, and utilizing technology to improve efficiency, accuracy, and scalability. Businesses may use robotic process automation (RPA) to automate repetitive tasks, freeing up human resources for more strategic endeavors [12].
- 2. Customer Engagement:** At the heart of digital transformation is the need to provide exceptional customer experiences. Businesses can use data analytics and customer insights to personalize interactions, anticipate needs, and foster meaningful engagements across multiple touchpoints. This includes implementing omnichannel strategies to ensure consistent experiences regardless of the channel or device used by customers [13].
- 3. Data Utilization:** Data is the lifeblood of digital transformation, allowing businesses to make more informed decisions and gain a competitive advantage. Businesses can use advanced analytics to extract actionable insights from large datasets, allowing them to predict market trends, identify new opportunities, and optimize resource allocation. Furthermore, data-driven decision-making promotes continuous improvement and agility, enabling organizations to respond quickly to changing market dynamics [2].
- 4. Product and Service Innovation:** Digital transformation acts as a catalyst for innovation, allowing businesses to create new digital products and services or improve their current offerings. Businesses can use emerging technologies such as artificial intelligence, machine learning, and augmented reality to create compelling value propositions that resonate with customers and set them apart from competitors. Furthermore, digital innovation allows for rapid prototyping, iterative development, and agile experimentation, which reduces time-to-market and increases responsiveness to customer feedback [14].
- 5. Organizational Culture:** The development of an agile, innovative, and customer-centric culture is critical to the success of digital transformation. This includes instilling a culture of continuous learning, experimentation, and collaboration at all levels of the organization. Leaders play an important role in driving change, empowering employees, and cultivating a culture of trust and psychological safety. Furthermore, organizations must invest in employee training and development to ensure that their workforce possesses the digital skills and competencies required to thrive in the digital age [6].

2.2 Drivers of digital transformation

Digital transformation is propelled by a confluence of factors that shape the strategic imperative for organizations:

1. *Technological Advancements:* Rapid technological advancements, such as artificial intelligence, the Internet of Things, blockchain, and cloud computing, are driving digital transformation across industries. These technologies enable businesses to automate processes, gain real-time insights, and provide personalized experiences at scale. Furthermore, the low cost of technology adoption and the proliferation of digital tools have democratized access to innovation, leveling the playing field for businesses of all sizes [4].
2. *Changing Consumer Expectations:* Today's consumers are more empowered, knowledgeable, and demanding than ever before. They expect seamless, personalized, and frictionless experiences at all touchpoints, prompting businesses to prioritize customer-centricity and responsiveness. Businesses can meet these expectations by leveraging data-driven insights to provide hyper-personalized experiences, anticipate needs, and cultivate long-term customer relationships [10].
3. *Competitive Pressure:* In an increasingly competitive marketplace, organizations must constantly innovate and differentiate themselves in order to maintain relevance and market share. Digital transformation gives businesses the tools and capabilities they need to increase operational efficiency, drive innovation, and provide superior value to customers. Furthermore, digital-native disruptors are challenging incumbents across industries, forcing traditional organizations to embrace digital transformation or face obsolescence [8].
4. *Regulatory Changes:* The regulatory landscape is rapidly changing in response to new digital technologies, data privacy concerns, and cybersecurity threats. Governments and regulatory bodies are enacting new laws and regulations to protect consumer data, promote ethical technology use, and increase transparency and accountability. Businesses can navigate these regulatory challenges by implementing strong compliance frameworks, implementing data encryption and cybersecurity measures, and cultivating a culture of ethical and responsible data use [9].
5. *Globalization:* The growing interconnectedness of the global economy, combined with advances in digital technology, has hastened the pace of globalization. Businesses are expanding their operations across borders, entering new markets, and utilizing digital channels to reach customers worldwide. Remote work, digital supply chains, and cross-border transactions are all enabled by digital transformation, which improves global collaboration, communication, and commerce (**Table 1**), [15].

Driver	Description
Technological Advancements	Innovations such as AI, IoT, and blockchain driving change
Changing Consumer Expectations	Increased demand for personalized and digital experiences
Competitive Pressure	Need to stay ahead of competitors through digital adoption
Regulatory Changes	Compliance with new digital regulations and standards
Globalization	Expanding reach and operations to global markets

Table 1.
Drivers of digital transformation. Key drivers of digital transformation. A table summarizing the key drivers of digital transformation.

2.3 Impact on business models

Digital transformation is reshaping traditional business models and giving rise to new paradigms for value creation and capture:

- *Subscription-Based Models*: Subscription-based business models, in which customers pay a recurring fee to access a product or service, have grown in popularity as a result of digital transformation. This model provides businesses with predictable revenue streams, increases customer loyalty, and allows for continuous innovation and iteration [16].
- *Platform-Based Ecosystems*: Digital platforms like Uber, Airbnb, and Amazon have disrupted traditional industries by establishing networked ecosystems that connect customers and providers. These platforms use digital technology to facilitate transactions, aggregate demand, and generate value via network effects. Furthermore, they allow businesses to scale quickly, enter new markets, and gain a greater share of the value chain [17].
- *Direct-to-Consumer (D2C) Models*: Digital transformation enables brands to sell directly to consumers online, bypassing intermediaries. This direct-to-consumer approach gives brands more control over the customer experience, increases brand loyalty, and allows for data-driven insights into customer behavior and preferences [10].
- *Data-Driven Decision Making*: Digital transformation enables businesses to make data-driven decisions in all areas of their operations. Businesses can use advanced analytics, machine learning, and predictive modeling to optimize pricing strategies, forecast demand, and personalize marketing campaigns. Furthermore, data-driven decision-making enables businesses to identify and capitalize on emerging trends, reduce risks, and promote continuous improvement [12].
- *Enhanced Customer Experiences*: Digital technologies enable businesses to provide customers with personalized, seamless, and immersive experiences across all touchpoints. Businesses can create cohesive omnichannel experiences that drive customer satisfaction, loyalty, and advocacy by combining interactive websites, mobile apps, social media engagement, and in-store interactions. Furthermore, digital transformation enables businesses to anticipate customer needs, address issues ahead of time, and build meaningful relationships with customers throughout their journey [13].

In summary, digital transformation is revolutionizing business models, driving innovation, and reshaping industries across the globe. By embracing digital transformation, organizations can unlock new opportunities for growth, differentiation, and sustainable competitive advantage in the digital age.

3. The role of education in nurturing digital entrepreneurs

3.1 Digital literacy and skill development

Digital literacy and skill development form the bedrock of readiness for entrepreneurs in the digital era. Digital literacy refers to a set of skills required for navigating

the complexities of the digital landscape and realizing its potential for business growth. Entrepreneurs must possess a multifaceted skill set, including:

- *Understanding Digital Tools:* Entrepreneurs must understand the functions and applications of various digital tools specific to their industry. This includes tools for project management, data analysis, customer relationship management (CRM), and communication platforms [6].
- *Data Analysis:* In the age of big data, the ability to analyze and draw insights from data is critical. To inform strategic decision-making and optimize business processes, entrepreneurs should be knowledgeable about data analysis techniques such as data visualization, statistical analysis, and predictive modeling [13].
- *Cybersecurity:* With cyber threats on the rise, entrepreneurs must prioritize cybersecurity to safeguard their digital assets and sensitive data. This includes putting in place strong security measures, following best data protection practices, and staying on top of emerging threats and vulnerabilities [7].
- *Digital Marketing Techniques:* Today's digital marketplace requires digital marketing to reach and engage target audiences. Entrepreneurs should understand digital marketing strategies such as search engine optimization (SEO), content marketing, social media marketing, and email marketing in order to effectively promote their products or services and drive customer acquisition and retention [18].
- *Proficiency in Software Development:* While software development skills are not required for all entrepreneurs, they can provide a competitive advantage when developing digital products or platforms. Understanding programming languages, software development frameworks, and agile methodologies allows entrepreneurs to effectively manage the development process and collaborate with technical teams [17].

Educational institutions are increasingly recognizing the importance of incorporating digital literacy into their curricula to prepare aspiring entrepreneurs with the necessary skills. Coding boot camps, online courses, and specialized programs provide accessible opportunities for entrepreneurs to learn technical skills that are directly applicable to their businesses. Furthermore, developing soft skills such as critical thinking, problem-solving, and adaptability is critical for navigating the complexities of digital transformation and achieving long-term success.

3.2 Entrepreneurial education initiatives

Entrepreneurial education initiatives are instrumental in fostering the growth of digital entrepreneurship by providing aspiring entrepreneurs with the knowledge, resources, and support needed to succeed in the digital age.

- *University and Business School Programs:* Universities and business schools are expanding their offerings to include specialized courses in digital entrepreneurship. These courses cover a variety of topics, such as digital business models, e-commerce strategies, digital marketing, and innovation management, to provide students with the skills and knowledge needed to start and grow digital businesses [19].

- *Startup Incubators and Accelerators:* Startup incubators and accelerators provide aspiring entrepreneurs with valuable resources, mentorship, and networking opportunities. These initiatives create a supportive ecosystem for early-stage startups by facilitating access to funding, expertise, and potential customers. Startup incubators and accelerators help entrepreneurs connect with mentors, investors, and industry experts, accelerating the growth and success of digital ventures [5].

3.3 Lifelong learning and adaptability

In the dynamic digital landscape, *lifelong learning and adaptability* are indispensable characteristics for entrepreneurial success. Rapid technological advancements constantly reshape industries, making previous knowledge obsolete. To remain competitive and relevant, entrepreneurs must adopt a continuous learning mindset.

- *Continuous Learning:* Lifelong learning takes many different forms, including online courses, professional certifications, industry conferences, and self-directed learning. Entrepreneurs should actively seek opportunities to broaden their knowledge and skills, staying current on emerging trends, technologies, and best practices in their fields [7].
- *Cultivating Adaptability:* Cultivating an adaptability culture within organizations creates an environment in which employees are encouraged to embrace change, experiment with new ideas, and strive for continuous improvement. This adaptability is a pillar of innovation and resilience in the digital age, allowing entrepreneurs to pivot quickly in response to market dynamics and seize new opportunities [1].

Entrepreneurs who prioritize digital literacy, participate in entrepreneurial education initiatives, and embrace lifelong learning and adaptability can position themselves for success in the fast-paced and ever-changing digital landscape.

4. Opportunities in the digital age

4.1 Market disruption and innovation

The digital age creates unprecedented opportunities for market disruption and innovation. Digital technologies enable entrepreneurs to challenge traditional market norms by providing innovative, customer-centric solutions [2]. For example, Airbnb and Uber have transformed traditional industries by leveraging digital platforms to develop new business models [11].

Furthermore, digital transformation enables the creation of novel products and services that meet changing consumer demands. Artificial intelligence (AI) and the Internet of Things (IoT) enable personalized experiences, smart solutions, and automation, driving industry-wide innovation (**Figure 1**), [12].

4.2 Global reach and scalability

The ability to easily reach a global audience is one of the defining features of the digital age. Digital platforms and e-commerce solutions break down geographical

Market Share

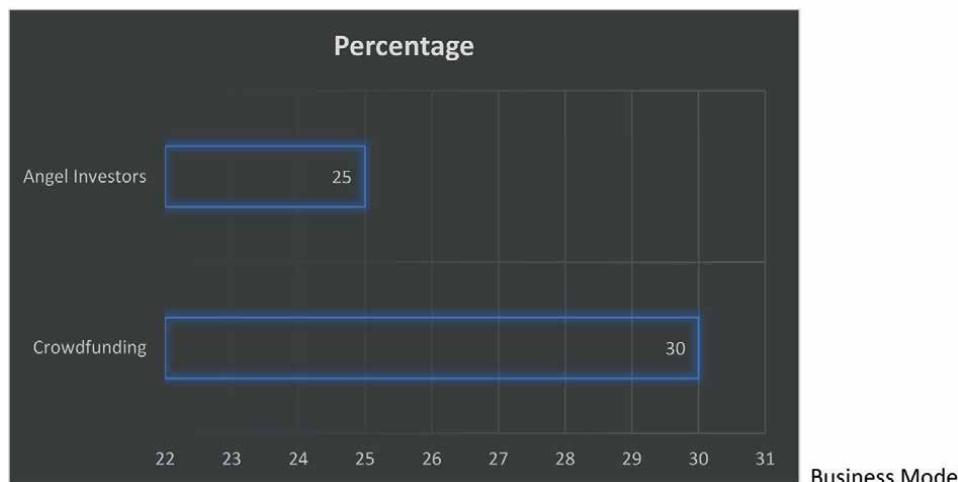


Figure 1.

Market disruption and innovation. Impact of digital technologies on market disruption. A bar chart comparing traditional vs. digital business models in terms of market share or growth rate.

barriers, allowing entrepreneurs to grow their businesses globally [3]. Establishing a strong digital presence allows businesses to reach new markets, interact with a larger customer base, and operate around the clock [6].

Furthermore, digital technologies improve scalability by streamlining processes and lowering costs. Cloud computing provides flexible, scalable infrastructure, while digital marketing tools enable targeted, cost-effective customer acquisition strategies, empowering entrepreneurs to rapidly expand their ventures [18].

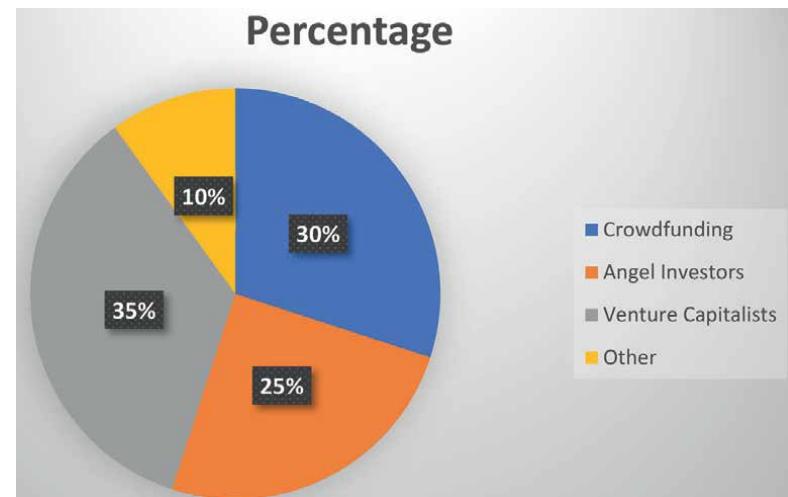


Figure 2.

Access to resources and funding. Distribution of funding sources for digital startups. A pie chart showing the distribution of funding sources for digital startups.

4.3 Access to resources and funding

Entrepreneurs now have more equitable access to resources and funding thanks to digitalization. Crowdfunding platforms, angel investors, and venture capitalists are increasingly willing to invest in digital startups, providing critical capital for growth and innovation [8].

Furthermore, digital resources such as online learning platforms, digital tools, and global networks of experts and mentors are extremely beneficial to entrepreneurs. These resources lower entry barriers and enable people from diverse backgrounds to confidently pursue entrepreneurial ventures (**Figure 2**), [5].

5. Navigating challenges and risks

5.1 Technological complexity and rapid change

Entrepreneurs in the digital realm face a landscape of constant technological evolution and rapid innovation. This dynamism provides both opportunities and challenges [7]. On the one hand, new technologies provide opportunities for development, efficiency, and competitiveness [4]. On the other hand, the rapid rate of change and complexity of emerging technologies can present significant challenges [2].

Technological complexity stems from the vast number of digital tools, platforms, and solutions available to entrepreneurs. Each technology brings its own set of features, functionalities, and integration requirements, which complicates decision-making processes. Entrepreneurs must navigate this complexity by staying current on emerging technologies relevant to their industry and understanding how these technologies can be used to drive business outcomes [20].

Furthermore, the rate of technological change exacerbates these challenges. What is cutting-edge today could become obsolete tomorrow as newer, more advanced solutions emerge. To keep up with these changes, digital entrepreneurs must embrace a continuous learning and adaptation mindset. This entails dedicating time and resources to ongoing education, skill development, and experimentation with new technologies [7].

Emerging technologies like artificial intelligence (AI), blockchain, and the Internet of Things (IoT) add to the complexity. While these technologies have the potential to drive innovation and efficiency, they also bring new challenges, such as data privacy concerns, cybersecurity threats, and regulatory complexities. Entrepreneurs must navigate these challenges by staying informed about the ethical and legal implications of these technologies, as well as implementing effective risk management strategies [12].

5.2 Digital divide and inclusivity

Despite widespread adoption of digital technologies, there are still significant disparities in access to digital resources and opportunities. This digital divide, which is frequently influenced by factors such as socioeconomic status, geography, and education level, presents challenges for aspiring entrepreneurs from underrepresented or marginalized communities [2].

The digital divide has multiple dimensions, including access to hardware and infrastructure (computers, smartphones, and internet connectivity), digital skills and literacy, and access to entrepreneurial support networks and funding opportunities [15]. Entrepreneurs from underserved communities may face entry barriers due to a lack of access to these critical resources.

Addressing the digital divide requires a multifaceted strategy. Community programs, government initiatives, and private-sector partnerships can help underserved communities gain access to digital infrastructure and education. Affordable internet access programs, digital skills training initiatives, and entrepreneurship support programs tailored to the needs of marginalized groups can all help to level the playing field and foster a more inclusive entrepreneurial ecosystem [6, 14].

5.3 Ethical and regulatory concerns

As digital technologies become more prevalent in everyday life, entrepreneurs face a slew of ethical and regulatory concerns. Data privacy, cybersecurity, algorithmic bias, and the responsible use of artificial intelligence are all topics that have gained traction in public discourse and regulation [12].

Data privacy and security are top priorities for digital entrepreneurs who collect, store, and process large amounts of personal and sensitive data. Data breaches and privacy violations can have serious financial and reputational ramifications for businesses, as well as undermine consumer trust and confidence [1].

Algorithmic bias, or unintended discrimination caused by algorithmic decision-making processes, raises ethical concerns for entrepreneurs using AI and machine learning technologies. Biased algorithms can exacerbate existing inequalities and reinforce discriminatory practices, resulting in social and ethical consequences [5].

Regulatory compliance is another source of concern for digital entrepreneurs, as governments around the world pass legislation to address emerging challenges in the digital domain. Entrepreneurs must stay current on evolving regulatory frameworks and ensure that their business practices comply with applicable laws and regulations. Failure to do so may result in legal consequences, including fines and other sanctions [8].

Navigating these ethical and regulatory challenges necessitates a proactive risk management strategy and a dedication to ethical decision-making. Entrepreneurs should prioritize transparency, accountability, and responsible technology use in their businesses. Investing in strong data security measures, conducting regular privacy assessments, and seeking legal advice as needed can help reduce risks and ensure compliance with applicable laws and regulations (**Table 2**), [4].

Concern	Description
Data Privacy	Issues related to the collection, storage, and use of personal data
Cybersecurity Threats	Risks associated with digital security breaches and cyber attacks
Algorithmic Bias	Unintended discrimination from AI and machine learning algorithms
Regulatory Compliance	Adhering to evolving laws and regulations in digital spaces

Table 2.
Ethical and regulatory concerns. Ethical and regulatory concerns in digital technologies. A table listing the major ethical and regulatory concerns associated with digital technologies.

6. Case studies and examples

6.1 Successful digital entrepreneurs

Studying the experiences of successful digital entrepreneurs can provide valuable insights into the strategies, characteristics, and practices that contribute to their success. Visionary leaders like Jeff Bezos, Elon Musk, and Jack Ma have founded iconic businesses that have transformed industries and reshaped the digital landscape.

Jeff Bezos' unwavering focus on customer obsession and long-term thinking has been critical to Amazon's rapid growth and dominance in e-commerce and cloud computing [21]. Elon Musk's audacious vision and willingness to take calculated risks have catapulted Tesla, SpaceX, and other companies to the forefront of innovation in electric vehicles, space exploration, and renewable energy [22]. Alibaba's pioneering spirit and commitment to empowering small businesses have propelled the company to the top of the global e-commerce, digital payments, and cloud computing markets [23].

Examining the journeys of these successful entrepreneurs can provide aspiring business leaders with valuable insights into the importance of innovation, resilience, and customer-centricity in launching successful digital businesses. They can learn from their successes and failures, identify key strategies and best practices, and apply these lessons in their own entrepreneurial endeavors.

6.2 Lessons learned from failures

In addition to studying success stories, analyzing failures in the digital entrepreneurship space can provide valuable learning experiences. Companies such as Blockbuster, Kodak, and Nokia serve as cautionary tales about the dangers of complacency, inertia, and refusal to change in the face of digital disruption [24].

Blockbuster's failure to adapt to the rise of online streaming and alternative distribution models resulted in its demise, highlighting the importance of agility and innovation in responding to changing consumer preferences and market dynamics [25]. Kodak, once a dominant force in the photography industry, failed to anticipate the transition to digital photography and the rise of smartphone cameras, eventually declaring bankruptcy [26]. Nokia, a former mobile phone manufacturing leader, struggled to keep up with competitors in the smartphone era because it was hesitant to adopt touch-screen technology and the Android operating system [27].

These failures highlight the importance of being agile, adaptable, and willing to disrupt one's own business model in order to stay ahead of the curve. Digital entrepreneurs must remain vigilant, constantly scanning the horizon for emerging trends and technologies, and be prepared to pivot or reinvent their businesses as needed. Learning from these failures can help entrepreneurs avoid common pitfalls, challenge conventional wisdom, and foster an innovative and experimental culture within their organizations. By examining these challenges, risks, and real-world examples, entrepreneurs can gain a better understanding of the digital landscape's complexities and develop effective strategies for navigating it.

7. Conclusion

7.1 Summary of key points

In this chapter, we delved into the intricate domain of digital entrepreneurship, examining its various facets, challenges, and opportunities. Here is a recap of the main takeaways:

- *Digital Transformation:* We explored how digital transformation has reshaped traditional business models, offering unprecedented opportunities for innovation, efficiency, and scalability [1, 4, 11].
- *Education and Skills Development:* Recognizing the pivotal role of education in nurturing digital entrepreneurs, we highlighted the importance of initiatives aimed at fostering digital literacy, entrepreneurial skills, and lifelong learning [5, 13, 28].
- *Opportunities in the Digital Age:* We discussed the myriad opportunities presented by the digital age, including market disruption, global reach, scalability, and enhanced access to resources and funding [6, 12, 17].
- *Challenges and Risks:* Addressing the flip side, we examined the challenges and risks inherent in digital entrepreneurship. From technological complexity and the digital divide to ethical and regulatory concerns, entrepreneurs face a host of obstacles that require careful navigation and proactive risk management [10, 15, 18].
- *Case Studies and Examples:* Drawing insights from real-world case studies, we analyzed both successful and failed digital ventures. By examining the strategies, characteristics, and practices of exemplary entrepreneurs, as well as the lessons learned from failures, we gleaned valuable insights into the dynamics of digital entrepreneurship [8, 14, 20].

7.2 Future outlook

Looking ahead, the future of digital entrepreneurship is both promising and intriguing. Emerging technologies like artificial intelligence, blockchain, and augmented reality are poised to disrupt industries and open up new opportunities for innovation. However, these opportunities bring new challenges, such as cybersecurity threats, regulatory complexities, and ethical quandaries.

To succeed in this rapidly changing environment, entrepreneurs must cultivate a mindset of continuous learning, adaptability, and resilience. Staying ahead of the curve will require embracing emerging technologies, staying on top of industry trends, and cultivating an innovative culture [3, 9]. In addition, a greater emphasis on ethical and responsible practices will be required to maintain stakeholder trust and credibility [19].

7.3 Recommendations

Based on our analysis, we propose the following recommendations for aspiring digital entrepreneurs:

- *Invest in Education:* Prioritize education and skill development to lay a solid foundation for success in the digital era. Explore opportunities for learning and upskilling in digital literacy, data analytics, and emerging technologies [2, 7].
- *Embrace Innovation:* Develop an innovative culture within your organization by encouraging creativity, experimentation, and risk-taking. Stay aware of emerging technologies and market trends, and be willing to adapt your business model accordingly [16, 19].
- *Prioritize Ethical Practices:* Include ethical considerations in your business practices to ensure transparency, fairness, and respect for privacy. Follow applicable regulations and standards, and actively engage with stakeholders to address ethical concerns [21].

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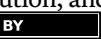
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Section 3

Education

Chapter 8

Beyond Education: Scenarios of the Re-Imagined Higher Education from the Future

David E. Kalisz

Abstract

The landscape of higher education is undergoing a profound transformation driven by rapid technological advancements and evolving societal needs. This chapter explores the pivotal role of strategic foresight in preparing institutions for future challenges and opportunities. Higher education is revolutionized by integrating artificial intelligence (AI), machine learning (ML), automation, and robotics into teaching methodologies, offering personalized learning experiences and efficient data analysis. These technologies enhance educational delivery and create new interactive and practical learning avenues. The probable futures of higher education involve a blend of virtual and physical learning spaces, increased accessibility, and a focus on lifelong learning. Within this evolving context, the role of faculty is re-imagined, emphasizing mentorship, curriculum innovation, and the facilitation of student engagement with cutting-edge technologies. This shift necessitates a dynamic blend of traditional teaching roles with the capabilities to integrate and leverage technological advancements, preparing students for an uncertain and exciting future. This chapter also addresses ethical considerations, challenges, and the need for continuous professional development to implement these innovations effectively. Higher education can navigate its dynamic landscape through strategic foresight and technological integration, remaining relevant and impactful.

Keywords: strategic foresight, artificial intelligence, higher education, automation, interactive learning

1. Introduction

The landscape of higher education is undergoing a profound transformation driven by rapid technological advancements and evolving societal needs. Strategic foresight emerges as a crucial approach for educational institutions, enabling them to anticipate and navigate future challenges and opportunities. Integrating artificial intelligence (AI), machine learning (ML), automation, and robotics into teaching methodologies revolutionizes the educational experience, offering personalized and efficient learning experiences.

As we look toward the future, the concept of higher education extends beyond traditional classrooms, embracing a blend of virtual and physical learning spaces.

This shift enhances accessibility and fosters a culture of lifelong learning. Within this dynamic context, the role of faculty is evolving to emphasize mentorship, curriculum innovation, and the integration of advanced technologies. This chapter delves into these transformative elements, exploring the strategic foresight necessary for higher education to thrive in an uncertain and exciting future.

2. The role of strategic foresight in higher education

Strategic foresight refers to systematically exploring potential futures to inform present-day decision-making. It involves identifying emerging trends, anticipating challenges, and envisioning various scenarios to prepare for possible outcomes. In higher education, strategic foresight is essential as it allows institutions to proactively shape their futures rather than react to changes [1].

Historically, higher education has slowly adapted to change, often constrained by traditional structures and practices. However, the rapid pace of technological advancements and shifting societal needs demand a more agile and forward-thinking approach. Strategic foresight provides the tools and frameworks to navigate this complexity, ensuring institutions remain relevant and effective in delivering education [2]. The concept of foresight in education is not entirely new. Historically, educational institutions have engaged in various long-term planning and visioning forms. However, the formalization of strategic foresight as a discipline emerged in the latter half of the twentieth century, influenced by developments in corporate and government sectors [3].

Early efforts in educational foresight focused on demographic projections and resource planning. Over time, the scope expanded to include technological forecasting, societal trends, and learners' evolving needs. Notable initiatives, such as the OECD's Schooling for tomorrow project, highlighted the importance of foresight in shaping educational policy and practice [4]. Several methodologies and models underpin strategic foresight, each offering a unique lens to explore the future. Common approaches include scenario planning, Delphi methods, environmental scanning, and trend analysis [5].

- Scenario planning: This approach involves creating detailed narratives about different possible futures. It allows institutions to explore a range of outcomes and develop strategies that are robust across multiple scenarios [6];
- Delphi method: The Delphi method gathers insights from experts through iterative surveys, converging on a consensus view of future trends and challenges [7];
- Environmental scanning: This involves systematically monitoring and analyzing external factors that could impact higher education, such as technological advancements, policy changes, and socio-economic shifts [8];
- Trend analysis: Identifying and analyzing trends provides insights into the direction of change and potential future states [9].

Each of these methodologies contributes to a comprehensive foresight process, enabling institutions to make informed decisions and develop adaptive strategies. Several higher education institutions have successfully implemented strategic

foresight initiatives, demonstrating its value in shaping the future of education. For example, the University of Houston's Foresight Program integrates foresight principles into its curriculum, preparing students to navigate future uncertainties [10]. Another notable example is the Future of Learning project by the Institute for the Future. This initiative explores how emerging technologies and societal shifts will transform learning experiences, providing valuable insights for educational institutions worldwide [11]. These case studies highlight the diverse applications of foresight in higher education, from curriculum design to institutional strategy, and underscore the importance of a proactive approach to future planning.

While strategic foresight offers significant benefits, it also presents challenges and limitations. One major challenge is the inherent uncertainty of predicting the future. Despite sophisticated methodologies, foresight cannot provide definitive answers but a range of possibilities [12].

Additionally, implementing foresight initiatives requires institutional commitment and resources. Resistance to change, limited funding, and a lack of expertise can hinder the adoption of foresight practices. Addressing these challenges involves fostering a culture of innovation, investing in professional development, and building partnerships with external experts [13].

3. Integration of artificial intelligence and machine learning

Artificial intelligence (AI) and machine learning (ML) are transforming various sectors, and education is no exception. AI refers to the capability of machines to mimic human intelligence, while ML is a subset of AI that enables systems to learn from data and improve over time. In the educational context, these technologies offer powerful tools to enhance learning experiences and outcomes [14]. AI and ML can personalize learning, providing tailored educational experiences that adapt to individual students' needs and preferences. By analyzing vast data, these technologies can identify patterns and insights that inform teaching strategies and curriculum design. This personalized approach fosters deeper engagement and improves academic performance [15].

One of the most significant impacts of AI in education is the ability to offer personalized learning experiences. Traditional education often follows a one-size-fits-all model, which can fail to address the diverse needs of students. AI-driven platforms can create customized learning paths, adapting content and pacing to suit individual learners [16]. For example, adaptive learning systems use AI algorithms to assess a student's strengths and weaknesses, providing targeted resources and exercises to address specific areas for improvement. This personalized approach enhances learning outcomes and boosts student motivation and satisfaction [17].

AI and ML are revolutionizing data analysis and decision-making in education. These technologies can uncover valuable insights into student performance, engagement, and retention by processing large datasets. Educators can use this information to make data-driven decisions, improving the effectiveness of teaching methods and interventions [18]. For instance, predictive analytics can identify students at risk of dropping out, allowing institutions to implement timely support measures. AI-driven dashboards provide real-time analytics, enabling educators to monitor progress and adjust their strategies accordingly. This data-centric approach enhances educational delivery's efficiency and effectiveness [19]. Integrating AI into educational tools and platforms transforms how students learn and interact with content. AI-powered

chatbots, for example, provide instant support and feedback, enhancing the learning experience. Virtual tutors use natural language processing to engage students in interactive conversations, offering personalized guidance and assistance [20].

AI-driven platforms facilitate collaborative learning by connecting students with peers and mentors worldwide. These platforms leverage AI to match learners with compatible study partners, fostering a global learning community. The use of AI in educational tools and platforms is expanding the boundaries of traditional education, creating new opportunities for engagement and collaboration [21]. While the benefits of AI and ML in education are substantial, they also raise important ethical considerations and challenges [22]. Data privacy, algorithmic bias, and the digital divide must be addressed to ensure these technologies' responsible and equitable use [23]. Data privacy is critical, as AI collects and analyzes vast student data. Institutions must implement robust data protection measures to safeguard sensitive information.

Additionally, algorithms used in AI-driven systems must be transparent and free from bias to ensure fair and equitable treatment of all students [24]. The digital divide presents another challenge: not all students can access technology and resources equally. Addressing this issue requires targeted initiatives to bridge the gap and ensure all learners benefit from AI-enhanced education [25].

4. Automation, robotics, and interactive learning

Automation and robotics are increasingly prominent in education, offering innovative solutions to enhance learning and streamline administrative tasks. Automation involves using technology to perform tasks with minimal human intervention, while robotics involves designing and using robots to assist in various activities [26].

In education, automation can handle repetitive administrative tasks such as grading, attendance tracking, and scheduling, freeing educators to focus on teaching and mentoring. Robotics, on the other hand, can provide hands-on learning experiences in fields such as science, technology, engineering, and mathematics (STEM) [27]. The integration of automation and robotics into educational delivery offers numerous benefits. Automated systems can provide immediate feedback on assignments and assessments, enabling students to learn from their mistakes and improve their performance. This timely feedback is crucial for fostering a growth mindset and continuous learning [28]. Robotics can bring abstract concepts to life, making learning more engaging and interactive. For example, educational robots can demonstrate scientific principles, conduct experiments, and simulate real-world scenarios. These hands-on experiences deepen students' understanding and retention of complex concepts [29]. Automation and robotics in education extend beyond the classroom, providing practical and interactive learning experiences. For instance, virtual and augmented reality (VR/AR) technologies create immersive learning environments that simulate real-world situations. Students can explore historical events, conduct virtual lab experiments, and even take field trips to distant locations [30].

These interactive experiences enhance student engagement and motivation, making learning more enjoyable and memorable. Furthermore, they provide opportunities for experiential learning, allowing students to apply theoretical knowledge in practical contexts [31]. Virtual and augmented reality transform the educational landscape by creating immersive and interactive learning environments. Virtual reality (VR) involves the use of headsets to create fully immersive experiences, while augmented reality (AR) overlays digital information onto the physical world [32]. In

education, VR can transport students to different times and places, providing experiential learning opportunities that would be impossible in a traditional classroom. AR, conversely, can enhance textbooks and other learning materials with interactive elements, such as 3D models and animations [33]. VR and AR in education foster a more profound understanding and retention of complex concepts, making learning more engaging and effective. These technologies also support differentiated instruction, catering to diverse learning styles and preferences [34].

Ongoing advancements in automation, robotics, and interactive technologies will shape the future of education. Emerging trends such as artificial intelligence-powered tutoring systems, robotic assistants, and immersive learning environments will continue transforming the educational experience [35]. These technologies will enhance education delivery and open new interactive and practical learning avenues. As institutions adopt these innovations, they must address the associated challenges, such as ensuring equitable access and maintaining ethical standards [36].

5. The evolution of learning spaces and accessibility

The future of higher education will involve a seamless blend of virtual and physical learning environments. This hybrid approach combines the flexibility and accessibility of online learning with in-person education's social and interactive benefits [37]. Virtual learning environments provide students access to vast resources and learning materials, enabling self-paced and personalized learning. On the other hand, physical learning spaces facilitate face-to-face interactions, collaboration, and hands-on experiences. Integrating these environments creates a holistic and versatile educational expertise [38].

The COVID-19 pandemic accelerated the adoption of remote and hybrid learning models, demonstrating their potential to enhance education. Remote learning offers flexibility, allowing students to access education from anywhere in the world. Hybrid models combine online and in-person instruction, providing a balanced approach that caters to diverse learning needs [39]. These models will likely persist and evolve, offering new opportunities for accessibility and inclusivity. Institutions must invest in the necessary infrastructure and support systems to ensure the success of remote and hybrid learning models [40]. Ensuring accessibility and inclusivity is a critical consideration for the future of education. Technological advancements can bridge gaps and provide opportunities for learners with diverse needs and backgrounds. For example, assistive technologies such as screen readers, speech-to-text tools, and adaptive learning platforms can support students with disabilities [41].

Furthermore, online learning platforms can reach underserved and remote communities, providing access to quality education regardless of geographic location. Institutions must prioritize inclusivity in their strategic planning, ensuring all students benefit from technological advancements [42]. The design of learning spaces must evolve to support future education needs. Future-ready learning spaces are flexible, technology-enabled, and conducive to collaboration and innovation. These spaces should accommodate individual and group learning activities, providing a dynamic environment fostering creativity and critical thinking [43].

Critical features of future-ready learning spaces include modular furniture, interactive whiteboards, and high-speed internet connectivity. Additionally, these spaces should be designed with accessibility, ensuring all students can fully participate in the learning experience [44]. Several institutions are leading the way in designing future-ready learning spaces. For instance, the Massachusetts Institute of Technology (MIT)

has developed flexible learning spaces that support various teaching and learning activities. These spaces have advanced technologies, such as interactive displays and collaborative tools, creating an environment that fosters innovation and engagement [45].

Another example is the University of Melbourne, which has implemented a hybrid learning model that combines online and in-person instruction. The university's flexible learning spaces are designed to support this model, providing students with a versatile and engaging learning experience [46].

6. Re-imagining the role of faculty

The evolving landscape of higher education necessitates re-imagining faculty roles and responsibilities. Traditional teaching roles are expanding to include mentorship, curriculum innovation, and integration of advanced technologies. Faculty members must adapt to these changes, embracing new approaches to teaching and learning [47].

One fundamental shift is the emphasis on mentorship. As students navigate complex and rapidly changing environments, faculty members are crucial in providing guidance, support, and inspiration. Mentorship involves academic support, career advice, personal development, and fostering a growth mindset [48]. Mentorship is becoming a central component of the faculty role. Faculty members are expected to support student's academic and personal growth, helping them develop the skills and mindset needed for success in a dynamic world. This involves building strong relationships, providing personalized feedback, and encouraging critical thinking and self-reflection [49]. In addition to mentorship, faculty members must engage in curriculum innovation. Integrating advanced technologies and new pedagogical approaches requires continuous adaptation and innovation. Faculty members must be proactive in updating course content, incorporating new tools and methodologies, and aligning curricula with the needs of the future workforce [50].

The integration of cutting-edge technologies is transforming the teaching and learning experience. Faculty members must be proficient in using AI, ML, automation, and interactive tools to enhance educational delivery. This requires ongoing professional development and a willingness to experiment with new approaches [51]. For example, AI-driven tools can provide real-time feedback on student performance, allowing faculty to tailor instruction to individual needs. Virtual and augmented reality can create immersive learning experiences, bringing abstract concepts to life. By leveraging these technologies, faculty members can create engaging and effective learning environments [23]. Preparing faculty for future educational challenges involves investing in professional development and fostering a culture of continuous learning. Institutions must provide opportunities for faculty to develop their skills and knowledge, staying abreast of the latest educational trends and innovations [52]. Professional development programs should focus on integrating technology, innovative pedagogical approaches, and developing mentorship skills. Additionally, institutions should encourage collaboration and knowledge-sharing among faculty members, creating a supportive community of practice [53].

The future of higher education is filled with exciting possibilities and challenges. By embracing strategic foresight, integrating advanced technologies, and re-imagining faculty roles, institutions can navigate this dynamic landscape and prepare students for an uncertain yet exciting future. The ongoing evolution of education requires a proactive and adaptive approach, ensuring that higher education remains relevant and impactful in a rapidly changing world.

7. Conclusion

This chapter has explored the key elements shaping the future of higher education, from strategic foresight to the integration of AI and automation, the evolution of learning spaces, and the re-imagination of faculty roles. As institutions continue to innovate and adapt, they must prioritize accessibility, inclusivity, and ethical considerations, ensuring that all students can benefit from the transformative power of education. The journey ahead is both challenging and inspiring, offering new opportunities to re-imagine the possibilities of higher education in the future.

As we venture into the future, the landscape of higher education is set to be more dynamic and multifaceted than ever before. Institutions must rise to the challenge of integrating emerging technologies as tools and fundamental educational experience components. Integrating AI, machine learning, automation, and robotics will transform how knowledge is acquired, fostering a more personalized, efficient, and engaging learning environment. The blend of virtual and physical learning spaces will redefine the boundaries of traditional education, making it more accessible and flexible. This hybrid model will cater to diverse learning needs and preferences, promoting lifelong learning and continuous skill development. Institutions must design future-ready learning spaces that are adaptable, technology-enabled, and conducive to creativity and collaboration.

Faculty roles will evolve significantly, shifting from traditional teaching methods to roles emphasizing mentorship, innovation, and integrating advanced technologies. This transformation will necessitate continuous professional development and a willingness to embrace change. Faculty members will become facilitators of learning, guiding students through complex, technology-rich educational landscapes. A commitment to inclusivity and equity will mark the future of higher education. Technological advancements must be leveraged to bridge gaps and provide opportunities for all learners, regardless of their backgrounds or circumstances. The equitable distribution of gains resulting from these breakthroughs will be guaranteed by ethical factors such as algorithmic fairness and data privacy. The path forward is fraught with challenges but also brimming with potential. Higher education institutions must adopt a proactive and adaptive approach, using strategic foresight to navigate uncertainties and seize opportunities. By embracing innovation and fostering a culture of continuous learning and development, they can prepare students for an exciting and unpredictable future.

The future of higher education is a canvas of possibilities where strategic foresight and technological integration will play crucial roles. Institutions that embrace these changes will remain relevant and lead the way in creating an educational experience that is more engaging, inclusive, and impactful. The journey is daunting, yet it promises to transform education for generations to come, making it more responsive to the needs of an ever-evolving world. The challenges are immense, but the potential for innovation and progress is boundless, paving the way for a future where education empowers and enlightens like never before.

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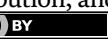
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Comparative Study of the Relationship between Social Intelligence and Entrepreneurial Intentions of Students from Bulgaria and Romania

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and Andra Diaconescu*

Abstract

The main focus of this article is to highlight the relationship between social intelligence and entrepreneurial intentions of students from higher education systems. This relationship is essential for the deployment of the concept of social economy and the promotion of socially responsible business models. Family businesses and social enterprises are among the promising business initiatives of the future that should be encouraged throughout the educational process, from kindergarten to doctoral students. In this regard, this chapter aims to present a comparative study of the relationship between social intelligence and the entrepreneurial intentions of respondents from Politehnica University Timisoara, Romania and the University of Ruse “Angel Kanchev”, Bulgaria. The study substantiates the thesis that, through its components—social support and self-efficacy—students’ social intelligence influences their desire and intention to start a business venture. In addition, the authors prove that an individual’s social intelligence plays a vital role in the formation of socially responsible business ventures. The results of the study indicate that educational institutions should make efforts to initiate or enrich already existing courses that develop social intelligence and belonging among students. Therefore, this study is important for researchers, practitioners, and other stakeholders. The research contributes to social economy theory, social entrepreneurship, and intergenerational business models.

Keywords: social intelligence, entrepreneurial intentions, social support, family support, self-efficacy, high education

1. Introduction

The deepening global crises, recessions, and conflicts emphasise the need to search for new alternatives to resolve the problems. This brings to the fore the placement of

the social question at the heart of the economy and the modern development of societies. But should the social be sought and motivated only from an economic point of view? Is a socially oriented society possible without an individual's social intelligence to develop and adapt to the new reality? Do social skills influence young people's entrepreneurial intentions to start socially oriented business initiatives?

In general, social intelligence is defined as a critical factor for success in entrepreneurship and family business, but it is still understudied [1]. Social intelligence, or social skills, refers to how well people are aware of and interact with each other in different contexts [2]. Social skills enable employees to avoid conflict, manage expectations, and communicate successfully. Learning what social skills are and how to improve them can help an individual have better workplace relationships and a healthy work environment [3, 4].

Therefore, people with high social intelligence are more likely to handle stress, be self-confident, and feel supported, making them more prone to entrepreneurial intentions. The ability to successfully navigate life is highly dependent on the level of social intelligence. This affects the relationships people build with partners, children, and friends, as well as their career development. Understanding social intelligence benefits society. Through its development, specific skills can be cultivated to improve the social environment for various disadvantaged groups [1].

At the same time, social entrepreneurs and enterprises, as well as family and intergenerational business initiatives, can be defined as agents of change. They tackle society's most challenging problems with fresh ideas and innovative solutions. They use specific approaches to construct business models to manage and develop their enterprise with a predominantly social mission. That focus on social impact makes them essential players in driving progress and creating a more equal society [5].

Starting businesses has always been a powerful way to boost the economy and tackle social issues. That idea of businesses with a dual purpose—making money and creating social good—is becoming increasingly popular, both in theory and practice. The rise of social entrepreneurship and the recognition of family businesses as a vital part of a healthy social economy are prime examples [6]. Social entrepreneurship plays a significant role in developing countries. These countries often struggle with social inequality and limited economic opportunities. As Tiwari et al. [5] point out, social entrepreneurship acts as a catalyst, using social skills and innovation to overcome these social, economic, and political inequalities.

To create an environment that encourages people to start businesses with a social purpose, researchers need to understand what motivates this kind of behaviour. This means figuring out what makes people think about social responsibility in business and what pushes them actually to start these ventures. In the role of such a factor, the effect of students' social intelligence in predicting their intention to start a business can be assumed and studied, as their social networks and intelligence could improve their ability to identify opportunities [7].

In this study, the authors look for an indirect effect of students' social intelligence on their intention to choose intergenerational business models for their professional development. The main objectives of the research are (1) Evaluation of the entrepreneurial intention of the students; (2) Identification and selection of key competencies of the socially intelligent person; (3) Assessment of students' sense of social support; (4) Evaluation of students' sense of self-efficacy; (5) Search for correlations between social intelligence, sense of social support, sense of self-efficacy, and entrepreneurial intention of students; and (6) Comparative analysis of the results and the choosing groups of the respondents.

The study is structured as follows: (1) A literature review of the existing theoretical knowledge in the field of social intelligence and entrepreneurial intention; (2) Identifying the role of the high educational system in forming entrepreneurship intentions in students from Politehnica University Timisoara (UPT), Romania and the University of Ruse “Angel Kanchev”(URAK), Bulgaria; (3) Developing of thesis and hypotheses and construction of a conceptual model of the study; (4) Comparative analysis of the results and search for relationships along the “social intelligence—entrepreneurial intention” axis between students from Politehnica University Timisoara, Romania and the University of Ruse “Angel Kanchev”, Bulgaria; and (5) Formulating conclusions and summaries.

The study contributes to the theory of social economy, social entrepreneurship, and intergenerational business models by looking for a correlation between students' social intelligence and their entrepreneurial attitudes. Thus, it aims to predict the formation of intention for socially oriented entrepreneurship, including family and intergenerational businesses.

2. Literature review on social intelligence and the need to stimulate entrepreneurship

In 1920, Edward Thorndike distinguished intelligence into three categories—*abstract* (understanding and managing ideas), *mechanical* (understanding and managing concrete objects), and *social* (understanding and managing people and communities). Thorndike associates social intelligence primarily with the ability to act wisely in human connections [8]. Vernon offers a more general description, presenting social intelligence as the ability and social technique not only to get along with people but also to identify social problems, a tendency to stimuli from other group members, and understanding momentary attitudes and essential individual features to both familiar and strangers [1].

In a broad sense, social intelligence is defined as the ability to connect effectively with other people. This kind of intelligence means that one is aware of the thoughts and feelings of others, even if they do not share or describe them explicitly. Essential traits that characterise socially intelligent people include effective listening and communication, respecting the impression they make on others, and making a conscious effort to avoid arguments [8]. Four components of social skills can be inferred [1–4, 8]:

1. *self-awareness* or the ability to understand one's abilities, thoughts, and feelings, as well as self-involvement in how one responds to others;
2. *self-regulation* or self-management refers to how an individual applies self-awareness to cope with any challenging situations; it is likened to an internal decision-making process;
3. *social awareness* or the way an individual recognises and interprets social cues, body language, and subtext when interacting with others;
4. *relationship management*, or social awareness, may include avoiding confrontation, developing empathy, understanding how personal motivations may differ from those of others, and identifying the role a particular person plays in one's social network.

Howard Gardner, in his theory of multiple intelligences, defines two types of intelligence: interpersonal or social and intrapersonal or emotional. The author considers them as independent but related units. If social intelligence reflects the ability to understand others—how they work and what motivates them, then emotional intelligence is perceived more as an ability intrinsic to the individual [8]. The focus of emotional intelligence is an individual's understanding and mastery of one's own emotions, but above all, the use of this knowledge to navigate behaviour. In this sense, this is the definition of Mayer and Salovey, according to which emotional intelligence is the ability to perceive, understand, manage, and express emotions. Scientists claim that maintaining a sober mind is extremely important and supports, on the one hand, the process of understanding emotions and emotional cognition and, on the other, the regulation of emotions, which leads to the emotional and intellectual growth of the individual [1, 9].

The comparison with emotional intelligence is essential in defining social intelligence. Unlike emotional intelligence, social intelligence focuses on the intimate but intellectual connection between people [4]. The most famous researcher of both emotional and social intelligence, Daniel Goleman, believes that social intelligence goes beyond the psychology of one person to the psychology of two and looks at the relationship shared between individuals. The author defines it as a set of (1) *social sense*, which consists of primary empathy, attunement, empathic accuracy, and social cognition, and (2) *social skills*, the spectrum of which includes synchronisation, self-presentation, influence, and active empathy [2].

Acquiring and practising social skills helps an individual perceive other people's emotions and understand their motivations [9]. As one improves one's social skills, one becomes more adept at overcoming interpersonal challenges. With strong social skills, a person can establish, maintain, and strengthen relationships that can help them advance at work. Among these types of skills are [3] written communication, nonverbal communication, conflict resolution, empathy, and emotional intelligence.

In a narrower sense, social intelligence can be defined as a relationship-based construct that focuses on the way a person understands, interacts with, and presents himself to others [9]. In one's working life, one encounters different social groups, including people from different countries, different age groups, and various religious and cultural identities, and in order to engage positively with others, it is vital to understand and accept these social differences [1]. The ability to understand and acknowledge the different specificities of people is a crucial way to connect and socialise. During work, a person must cooperate with other people with whom it is usually possible not to communicate [10]. From this perspective, developing a socially intelligent workforce and a socially intelligent entrepreneurial ecosystem is more critical than ever.

On the other hand, entrepreneurship and entrepreneurial intentions are described as the exploration and evaluation of information that is useful in achieving the goal of creating a business. The dream of starting a business (entrepreneurial intentions) comes first—it is the spark that ignites the whole process of creating a new venture [6]. Entrepreneurship is not a one-size-fits-all kind of thing. People can be entrepreneurial outside of companies, like a student who organises events to make extra money. Entrepreneurship can also happen within organisations like corporate or intrapreneurship and does not necessarily include business activities, e.g. social entrepreneurship. That variety shows that entrepreneurship is more about a set of actions, and whether someone is likely to take those actions depends on their personality [11]. All of these factors make entrepreneurial motivation important to research because it

influences an individual's actions and thinking, which in turn affects their intention to start a new venture [12].

At the same time, studies in the field of social intelligence and entrepreneurship show that these two concepts have a significant and positive relationship with each other [7]. Tiwari and his co-authors, in turn, prove that students with emotional intelligence—part of social intelligence—are more inclined towards social entrepreneurship activities [12]. The relationship between social intelligence and entrepreneurial intention can be found in the individual's ability to deal with challenging situations [8]. Gan and Yaacob argue that entrepreneurship is a continuous process requiring entrepreneurs to identify new business opportunities [7], which implies a serious dose of self-awareness, self-efficacy, and self-control. This motivates a number of entrepreneurship studies, specifically analysing self-regulatory processes in different fields. These studies are particularly relevant because self-regulation itself is part of both emotional and social intelligence and can be developed through a person's control over beliefs, feelings, instincts, inspirations, and behaviour [13].

One of the first attempts to develop a model that can precisely capture social entrepreneurship intention formation was proposed by Mair and Noboa. In their model, they apply different variables to assess intentions, assuming that the intention to start a social enterprise evolves from perception to desire. This desire is, in turn, influenced by a cognitive-emotional construct with two elements: empathy (as an emotional factor) and moral judgement (as a cognitive factor). Accordingly, the sense of feasibility is influenced by the aspects of self-efficacy and social support, which is not a new conclusion for scientists. In fact, what sets this model apart from traditional entrepreneurial models is empathy and moral judgement. As a result of their studies, the researchers concluded that not everyone who approaches with empathy and moral judgement becomes an entrepreneur. However, a certain level of developed empathy and built moral judgement is undeniably necessary to trigger the process or form the intention of social entrepreneurship [5].

Hockerts attempts to validate and refine Mair and Noboa's model by modifying it and eliminating the mediating variables—perceived desirability and perceived feasibility. He experimented by testing the immediate influence of moral obligation, entrepreneurial self-efficacy, empathy, and perceived social support on social entrepreneurship intention. The scientist studied three different cohorts and found a positive relationship with social entrepreneurship intention [5].

Ernst, for his part, conducted a study on a sample of 203 students from four German universities to investigate social entrepreneurship intention. His applied model uses data such as personality traits, role models, age, gender, education, and experience to predict social entrepreneurship intention. Despite the wide range of elements, Ernst's model fails to find correlations between empathy and social entrepreneurship intention [5].

Siddiqui and his co-authors argue that the importance of emotional intelligence in entrepreneurship literature is now well-established. According to them, a number of studies prove that people with a high level of emotional intelligence are considered more inclined to create and maintain their ventures. Adaptive competencies play a crucial role in a person's career success, and those who lack flexible skills and social intelligence do not find success in their careers. Emotional and social intelligence have been shown to work as critical factors for employee career growth, but minimal empirical research has highlighted the relationship between social intelligence and entrepreneurial intentions [13].

On the other hand, an Iranian study found a significant relationship between emotional intelligence and the entrepreneurial propensity of SME managers [14]. Similarly, a study conducted in Pakistan identified a profound impact of the level of social intelligence on the development of an individual's entrepreneurial mindset [15]. Aykol and Yener also established a positive, significant relationship between the elements of social intelligence and the entrepreneurial intentions of students [16].

In Shepard's proposed conceptual model for studying the formation of entrepreneurial intention, emotional factors are pointed out as the main reason for business failure [17]. However, Zampetakis found that emotional intelligence positively impacts creativity and proactivity and, therefore, plays a vital role in the development of an entrepreneurial attitude [18].

Various research studies have highlighted the importance of emotional intelligence in relation to stress management and emotional breakdown, and stress management itself is often associated with positive attitudes towards entrepreneurship and entrepreneurial intentions [19]. In addition, the theory claims that entrepreneurial leaders require a significant level of emotional and social intelligence to motivate, understand, and influence the behaviour of their subordinates [19, 20]. Therefore, directing and managing emotions and feelings in the context of social intelligence, in whose construct emotional intelligence falls, not only can provide an essential competitive advantage but is also an indicator of entrepreneurial intent [5].

Both empathy and emotional intelligence are defined as skills inherent in socially intelligent people [3, 4, 8], and as is evident from the literature review, a connection between them and entrepreneurial intention is often sought [20]. Because the different authors build their studies around different variables, the results do not prove a categorically positive or categorically negative relationship between empathy, emotional intelligence, and entrepreneurial attitudes [13–20]. There are significantly fewer publications concretely looking for a similar correlation between social intelligence and entrepreneurship intention. The impact of social intelligence may be one of the critical variables to be investigated to predict entrepreneurial intention among college students [7]. In this sense, the present study aims to initiate the beginning of such research.

3. The role of the high educational system in forming entrepreneurship intentions in UPT and URAK

This chapter section presents some of the activities at Politehnica University Timisoara, Romania, and the University of Ruse "Angel Kanchev", Bulgaria, that are focused on developing entrepreneurial intentions in their students. The capacity of both high education institutions (HEIs) will be investigated in two dimensions: the status of the educational programs for bachelor's and master's students and some of their joint academic activities.

3.1 Educational programs for bachelors and masters in UPT and URAK

The entrepreneurship intentions at Politehnica University Timisoara start through the entrepreneurial management program at the bachelor and master levels. The entrepreneurial management programs train managers and entrepreneurs with special skills through complementary training to undergraduate studies and master graduate specialisations by developing scientific research capabilities in business management and entrepreneurship.

The objectives of the program are to develop skills and abilities specific to business management and entrepreneurship, through the complementarity of knowledge in undergraduate studies, respectively the development of scientific research capacity based on modern concepts, computer-assisted. Several educational programs imply entrepreneurship intentions:

- *Leadership in administration:* It represents a postgraduate program from the Politehnica University Timisoara that implies training and continuous professional development. The educational program offers training for experts in public administration. The objectives of the postgraduate program, expressed in professional skills and learning outcomes to be acquired by each person following the program, follow the occupational standards on which the study program is based, as follows: Public administration expert, COR code 242202 and Public administration consultant, COR code 242205.
- *Leadership in business:* It is also a postgraduate program from the Politehnica University Timisoara. The postgraduate program implies training and continuous professional development for managers in innovation and business. The objectives of the postgraduate program, expressed in the professional competencies and learning outcomes to be acquired by each person following the program according to the occupational standard on which the study program is based, as follows: Innovation Manager, COR code 242106 and Project Manager, COR code 241919.

UPT is focusing on developing business relations with important stakeholders through its entrepreneurial office, which aims to develop relationships with the business environment and involvement in the development of students' entrepreneurial skills. At UPT, there are 3 hubs designed to support innovation and entrepreneurs.

- *Hub MIRSC*—Microelectronics Research Center (MIRSC) —MIRSC aligns with the objectives of IPCEI-ME-2 and PNRR, aiming at designing new processor architectures (including RISC-V), communication circuits (5G, 6G, and others) and connectivity, advanced heterogeneous packaging, and circuits for power electronics and RF.
- *Entrepreneurial hub*—Be Smart, Be Competitive—The mission of the entrepreneurial hub is to facilitate and support the development of a solid, innovative, and efficient entrepreneurial environment in the fields of industrial and administrative management, logistics, marketing, sustainability, and education.
- *CIDIAS hub*—The research centre aims to develop applied research programs in data engineering, artificial intelligence, and intelligent systems that support the theoretical and technological developments of the coming years and respond to societal challenges by creating new businesses, services, and jobs. The research areas are artificial intelligence, cloud computing, cyber security, robotics, and intelligent control.

UPT has a strong participation in projects with a focus on entrepreneurship. UPT is involved in 3 major national entrepreneurial projects. These projects are:

1. AVEA project—entitled “Securing Your Future through Education and Entrepreneurship”. Among the objectives of the project, which took place between 2019 and 2021, 450 students participate in information-counselling activities in order to increase the level of entrepreneurship education, especially for disadvantaged groups, with a special aim to reduce the number of students who have difficulties related to the integration in the academic environment, respectively to the insertion on the labour market after the completion of the studies. The project has included 75 teachers in a postgraduate program of training and continuous professional development in order to develop skills in the field of innovative entrepreneurship.
2. SusRural project—Supporting and Developing Rural Social Enterprises. The overall objective of the project was to strengthen economic and social cohesion in the Western Region in order to combat poverty and the socio-economic integration of people belonging to vulnerable groups.

The objectives of the project were:

- Carrying out a package of two diagnostic analyses of the field of social economy at the level of the West region;
 - Establishing 6 partnerships with relevant actors in the labour market (business associations/hubs/clusters), in the education system/healthcare/social assistance/employment services, or in the local administration;
 - Improving the professional skills of 75 people wishing to set up social enterprises/social insertion enterprises in the Western region;
 - Encourage and support the development of social entrepreneurship by providing de minimis financial support to persons who have submitted business plans selected for financing for the establishment and development of 21 social enterprises/social insertion enterprises;
 - Development of an inclusive social entrepreneurship ecosystem through the development of 21 social enterprises/social insertion enterprises in order to develop 105 new jobs.
3. StartUPT project is a business accelerator aimed at students from all over the country who want to set up a start-up in any of the regions of the country, except Bucharest-Ilfov. The ideas were from areas such as IT, creative industries, tourism, health, and energy. Within this project, nationally certified entrepreneurship courses were held for at least 341 students, master's and doctoral students from all less developed regions who want to set up a business in economic sectors with competitive potential.

One important achievement is that UPT is an active partner in the European project E³UDRES²—Engaged and Entrepreneurial European University as Driver for European Smart and Sustainable Regions. The E³UDRES² consortium aims to create a European multi-university campus as a source of smart and sustainable innovations for small or medium-sized cities and their surrounding rural areas.

The project encourages and supports students' talents to turn their ideas into businesses that are regionally anchored but internationally connected. It will also increase the attractiveness of small and medium-sized cities and their rural regions for experienced innovators and companies that want to interact with regional ecosystems, recognising the potential of smart and sustainable regions in the context of complex global challenges. Until present, a number of smart regional development proposals and solutions have already been formulated by mixed teams of students and teaching staff from partner universities, within iLiving Labs and Hackathon-type events, where local institutions and companies have offered real-life challenges with the aim of achieving creative solutions developed by the E³UDRES² community. The strong focus on respective regions ("smart regions") and sustainability is what differentiates E³UDRES² from other European University alliances.

The University of Ruse "Angel Kanchev" provides education in entrepreneurship at the bachelor and master levels. There are several bachelor courses:

- *Risk management*: students are stimulated to investigate entrepreneurial risks when starting their firms. The teaching methodology was developed in 2005 thanks to the participation in ERASMUS lecturing at Karel-de-Grote Hogeschool, Antwerp. From 2005 to 2019, hundreds of ERASMUS students were educated at Karel-de-Grote Hogeschool, and the same methodology was applied to the bachelor's and master's students at the University of Ruse "Angel Kanchev" because the lecturer in the Risk Management course was the same. The Risk management course is offered to both bachelor's and master's students at the University of Ruse.
- *Planning and forecasting*: bachelor's students develop special business plans for the implementation of their business ideas. The recent template is TEHNOSTART, a program of the Bulgarian Ministry of Economics that provides financial support to entrepreneurs while they are students. Since 2000, this course has been used to attract students to the ceremony "Business Plan Competition", which happens every year, usually in May. The Planning and Forecasting course is offered to students from the Faculty of Business and Management and the Faculty of Transport.
- *Social entrepreneurship*: it was developed in 2019 thanks to the international project consortium INNOVENTER. The main idea is to show the students how to create incomes for people with disadvantages. There is a clear difference between social entrepreneurship and charity. The course is offered to bachelor's students in Social sciences and Social pedagogics because the target groups of these two graduates will be to deal with people with disadvantages. Recently, the Department of Management and Social Activities introduced a new master's program in Social Entrepreneurship.
- *Small business management*: This course started in 2007 with the aim of encouraging students to develop their business ideas. It improved with the two lecturers' participation in specific entrepreneurship training provided by Harvard Business School in the USA and the Netherlands.

Since 2009, the University of Ruse has offered a master's program in *Entrepreneurship and Innovation*, developed in close collaboration with Prof. Hans Wissema. Later on, it was improved on the basis of the university's participation

in the HEInnovate initiative of the European Commission. The main courses of this master's program are Introduction to Entrepreneurship, Business Models for Entrepreneurs, Sales Management, Production Management in a Small Firm, Financial Management for Entrepreneurs, Intellectual Property Rights, Growth Management, and others. The master's students graduate with a diploma thesis dedicated to the establishment of their businesses.

3.2 Joint scientific research in UPT and URAK on entrepreneurship

Since 2008, the two universities have joint scientific activities:

- *RESITA's academic network*, established in 2008, attracts scientists in the entrepreneurship area, mainly from Albania, Bosnia and Herzegovina, Bulgaria, Germany, North Macedonia, Romania, Serbia, and Slovenia. Their main activity is well described by Schulte et al. [21]. This network was quite active from 2008 to 2019, organising multinational training for their students, facilitating lecturer exchanges in entrepreneurship, and developing joint scientific articles.
- Romanian-Bulgarian joint scientific project “*A comparative study regarding the training needs for the development of entrepreneurial competencies in the context of EU post-integration*”, with the financial support of the Romanian National Authority for Scientific Research and the Bulgarian National Science Fund. The duration of this project was from 2009 to 2011, and the two universities were the only participants. It gave some opportunities for their scientists to work together and create some joint scientific publications.
- *INTERGEN* international academic network to study the intergenerational family businesses as a stress management instrument. The two universities have been among the co-founders of this network in 2018. This book chapter is a result of their joint research activity under INTERGEN. The activity of this network is well described by Bakracheva et al. [22].

Both universities have the proper academic capacity to encourage students to become entrepreneurs. Their joint membership in different international scientific networks has given fruitful results, such as joint articles and training of their students and lecturers.

4. Methodology design of comparative analyses of student intentions in UPT and URAK

The research methodology is based, on the one hand, on the data generated by the international network INTERGEN [22]; on the other hand, it borrows elements from Mair and Noboa's model to study socially oriented entrepreneurial intention [8].

INTERGEN's concept of intergenerational family enterprises aims to stimulate younger generations to have economic activities different from, but linked to, those of their parents. Thus, young people have the opportunity to develop socially oriented business models, promoting intergenerational relationships and the development of the regional/local entrepreneurial ecosystem [22].

At the same time, Mair and Noboa pioneered the development of a model describing the formation of social entrepreneurship intention. They divide this intention into

two stages: perception and desire. The present study implements the parameters of the second stage—desire, which is influenced by perceived feasibility. This feasibility, in turn, depends on the factors of self-efficacy and social support [8] inherent in the socially intelligent individual [2, 4].

The present study examines and compares the results generated for 2019, 2021, and 2023, respectively, at two of the academic institutions part of the INTERGEN network: Politehnica University Timisoara, Romania, and the University of Ruse “Angel Kanchev”, Bulgaria.

The primary purpose of the questionnaire is to explore attitudes towards family business between generations in different countries. Respondents must understand the questions, and therefore, each university has translated the questions into the official language of the respective country. Most of the responses are based on a Likert scale, where 1-No, 2-Rather No, 3-N/A, 4-Rather Yes, 5-Yes.

The two universities collected the responses through Google Forms, which facilitated subsequent analyses.

The first questionnaire, designed in 2018, included 40 questions [22]. The last three questions relate to personal data such as gender, age, and major study. It was used from 2018 to 2019 to collect answers from 12 universities—members of INTERGEN.

The second questionnaire, designed in 2020, has 57 questions. The last seven questions ask for additional information, such as gender, age, parent status, major study, etc. It was used in 2021/2022 and 2023/2024 to collect data from over 20 universities within the INTERGEN academic network.

The research limitations are mainly on the type of contact with the respondents. In 2018/2019, they were approached by printed papers in the classroom during the lessons. In the other two periods (2021/2022 and 2023/2024), each HEI has developed an online questionnaire and the respondents have been asked to follow that link and give their answers. During all three periods, the responses were anonymous.

For the research, three main questions from the survey conducted by INTERGEN were analysed, respectively answering the *entrepreneurial intention* of the students (Q3), the *self-efficacy* of the respondents (Q4), and the *sense of family (social) support* that the students have (Q5):

Q3. I would like to have my own business in some specific economic activities.

Q4. I know that in this world, you may succeed only if you rely on yourself.

Q5. I am convinced that my family would support me by all means.

The data are collected in electronic tables (MS Excel), which allows the authors of the present study and INTERGEN scientists to create graphical visualisations and perform correlation analyses.

Although entrepreneurial activity is defined as a function of the individual's personality [11] and, in this sense, implies a highly cultivated emotional intelligence [14], undoubtedly, the recognition and use of opportunities and the creation of value require developed social intelligence in the form of social sense and social skills [2]. In addition, the continuous identification of new business opportunities requires entrepreneurs to possess adequate self-awareness, self-confidence, and self-control. At the same time, the literature review identified social relationships and self-efficacy as essential signs of social intelligence and key factors predicting an individual's socially responsible entrepreneurial intention [5]. On this basis, the central thesis of the study is formulated: *There is a relationship between social intelligence and the entrepreneurial intentions of students.*

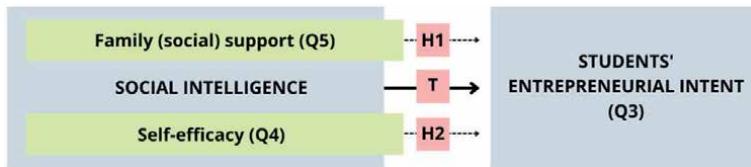


Figure 1.

Conceptual model of the study; Source: Own development.

Based on the presented thesis, both hypotheses of the study are defined. The first research hypothesis equates *social* and *family* support and examines the relationship between the feeling of unreserved support from parents to their children and the formation of entrepreneurial intention among students:

Hypothesis 1: Family support, a sign of developed social relationships, is a critical factor in forming students' entrepreneurial intentions. (To be analysed by Questions 3 and 5).

The second hypothesis suggests a relationship between students' self-efficacy in their abilities to achieve success and the intention to start an entrepreneurial initiative. Self-efficacy, a cornerstone of social cognitive theory, encapsulates an individual's unwavering belief in their capabilities to orchestrate the actions necessary to attain specific goals. It is a deep-seated conviction in one's ability to learn, continuously improve, and achieve desired outcomes, even in the face of daunting challenges [23]. For this study, self-efficacy is assumed to be equivalent to self-management from the skill set of socially intelligent people, and based on this, the second hypothesis is formulated:

Hypothesis 2: Self-efficacy as a sign of students' social intelligence positively influences their entrepreneurial attitude. (To be analysed by Questions 3 and 4).

The conceptual model of the study is visually represented in **Figure 1**.

5. Findings

The first data collection has been done in 2018 and 2019 among 139 Bulgarian students and 173 Romanian students. The majority of the respondents are Bulgarian females and Romanian males because of their major studies: In the University of Ruse "Angel Kanchev", the students are mainly from the Faculty of Business and Management (dominated by females), while in Politehnica University Timisoara, the respondents are primarily from the engineer faculties (dominated by males).

The second data collection was done in 2020–2021, during the COVID-19 restrictions. The educational process was primarily organised in virtual rooms, and the e-communication was quite successful. In the results, answers from 315 Romanian students and 289 Bulgarian students were obtained.

The third data collection took place in 2023 and 2024. It was after the post-COVID restrictions, and we got even more answers through Google forms—582 from the University of Ruse "Angel Kanchev" and 304 from Politehnica University Timisoara.

The following three tables present the responses to the three questions. The digits show the number of respondents, and below them are the share in percentages. Based on the percentages, we designed the three graphics (**Figure 2**), which visualise their answers.

Data in **Table 1** show that the positive answers ("Yes" and "Rather Yes") to Q3 are over 50% in the three periods. In both universities, the respondents are more favourable to having their businesses during the COVID-19 period. The negative

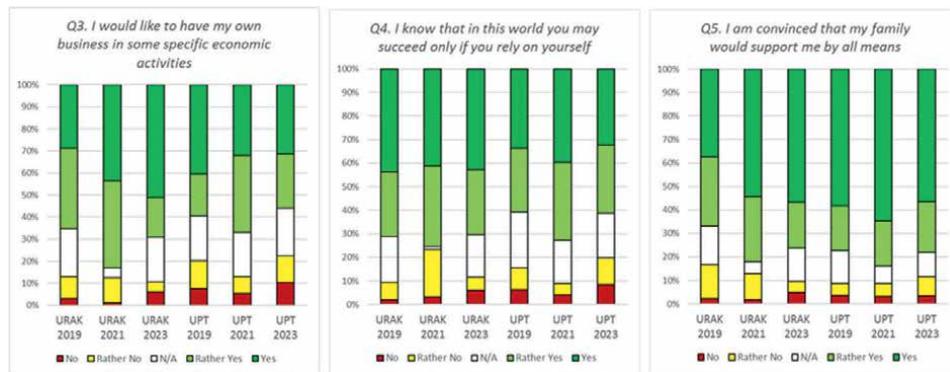


Figure 2.

Answers to Q3, Q4, and Q5 for the Politehnica University Timisoara and University of Ruse “Angel Kanchev”, Bulgaria, respectively for 2019, 2021, and 2023. Source: INTERGEN.

answers (“No” and “Rather No”) at the University of Ruse are with minor changes: 2.9% + 10.1% (in 2019), then 1.0% + 11.4% (in 2021), and 6.0% + 4.5% (in 2023). The significant change in the “N/A” answers at the University of Ruse occurred during the COVID-19 period when they were 4.5%, compared to 21.6% (in 2019) and 20.4% (in 2023).

Data in **Table 2** show that there is an increase in the positive answers (“Yes” and “Rather Yes”) to Q4 during the COVID-19 period. In contrast to UPT, the students from URAK have a dramatic reduction of their “N/A” answers during the COVID-19 period when they are 1.4%, compared to 19.4% (in 2019) and 18.2% (in 2023).

Data in **Table 3** show that over 65% of the respondents rely on their families. In all three periods, the Romanian students had more positive answers (“Yes” and “Rather Yes”) compared to the Bulgarian respondents. During the COVID-19 period, over 80% of the Romanians and Bulgarians were convinced that their families would support them by all means. In the post-COVID period, these responses decreased a little, and the positive answers are still relatively high—over 75% in both universities.

Answers Q3	No	Rather No	N/A	Rather Yes	Yes	Females	Males	Total
URAK 2019	4 (2.9%)	14 (10.1%)	30 (21.6%)	51 (36.7%)	40 (28.8%)	88 (63.3%)	51 (36.7%)	139 (100%)
URAK 2021	3 (1.0%)	33 (11.4%)	13 (4.5%)	114 (39.4%)	126 (43.6%)	220 (76.1%)	69 (23.9%)	289 (100%)
URAK 2023	35 (6.0%)	26 (4.5%)	119 (20.4%)	104 (17.9%)	298 (51.2%)	452 (77.7%)	130 (22.3%)	582 (100%)
UPT 2019	13 (7.5%)	22 (12.7%)	35 (20.2%)	33 (19.1%)	70 (40.5%)	77 (44.5%)	96 (55.5%)	173 (100%)
UPT 2021	17 (5.4%)	24 (7.6%)	63 (20.0%)	110 (34.9%)	101 (32.1%)	148 (47.0%)	167 (53.0%)	315 (100%)
UPT 2023	31 (10.2%)	37 (12.2%)	66 (21.7%)	75 (24.7%)	95 (31.3%)	131 (43.1%)	173 (56.9%)	304 (100%)

Table 1.

Answers to Q3. I would like to have my own business in some specific economic activities, respectively for 2019, 2021, and 2023. Source: INTERGEN.

Answers Q4	No	Rather No	N/A	Rather Yes	Yes	Females	Males	Total
URAK 2019	3 (2.2%)	10 (7.2%)	27 (19.4%)	38 (27.3%)	61 (43.9%)	88 (63.3%)	51 (36.7%)	139 (100%)
URAK 2021	9 (3.1%)	58 (20.1%)	4 (1.4%)	99 (34.3%)	119 (41.2%)	220 (76.1%)	69 (23.9%)	289 (100%)
URAK 2023	35 (6.0%)	32 (5.5%)	106 (18.2%)	161 (27.7%)	248 (42.6%)	452 (77.7%)	130 (22.3%)	582 (100%)
UPT 2019	11 (6.4%)	16 (9.2%)	41 (23.7%)	47 (27.2%)	58 (33.5%)	77 (44.5%)	96 (55.5%)	173 (100%)
UPT 2021	13 (4.1%)	15 (4.8%)	58 (18.4%)	104 (33.0%)	125 (39.7%)	148 (47.0%)	167 (53.0%)	315 (100%)
UPT 2023	26 (8.6%)	34 (11.2%)	58 (19.1%)	88 (28.9%)	98 (32.2%)	131 (43.1%)	173 (56.9%)	304 (100%)

Table 2.

Answers to Q4. I know that in this world, you may succeed only if you rely on yourself, respectively for 2019, 2021, and 2023. Source: INTERGEN.

The data in **Tables 4** and **5** reflect how the two assumed variables—self-efficacy and family support—influence the entrepreneurial attitudes of the groups of respondents from Bulgaria and Romania, respectively, in 2019, 2021, and 2023. Those who answered “No” and “Rather No” represent the respondents who do not, on the one hand, have a sense of self-efficacy and, on the other—do not feel family support. Those who marked “Yes” and “Rather Yes”, respectively, are convinced that they can rely on themselves for their success, as well as that they can depend on their families in case they decide to start their own business.

It can be seen from the results presented in **Table 4** that both self-efficacy and family support influence the entrepreneurial intention of URAK students in

Answers Q5	No	Rather No	N/A	Rather Yes	Yes	Females	Males	Total
URAK 2019	3 (2.2%)	20 (14.4%)	23 (16.5%)	41 (29.5%)	52 (37.4%)	88 (63.3%)	51 (36.7%)	139 (100%)
URAK 2021	5 (1.7%)	32 (11.1%)	15 (5.2%)	80 (27.7%)	157 (54.3%)	220 (76.1%)	69 (23.9%)	289 (100%)
URAK 2023	29 (5.0%)	26 (4.5%)	83 (14.3%)	114 (19.6%)	330 (56.7%)	452 (77.7%)	130 (22.3%)	582 (100%)
UPT 2019	6 (3.5%)	9 (5.2%) (13.9%)	24 (19.0%)	33 (19.0%)	101 (58.4%)	77 (44.5%)	96 (55.5%)	173 (100%)
UPT 2021	10 (3.2%)	17 (5.4%)	24 (7.6%)	60 (19.0%)	204 (64.8%)	148 (47.0%)	167 (53.0%)	315 (100%)
UPT 2023	10 (3.3%)	25 (8.2%)	32 (10.5%)	65 (21.4)	172 (56.6%)	131 (43.1%)	173 (56.9%)	304 (100%)

Table 3.

Answers to Q5. I am convinced that my family would support me by all means, respectively for 2019, 2021, and 2023. Source: INTERGEN.

Students' entrepreneurial intentions						
URAK'19		URAK'21			URAK'23	
	"No"/"Rather No"	"Yes"/"Rather Yes"	"No"/"Rather No"	"Yes"/"Rather Yes"	"No"/"Rather No"	"Yes"/"Rather Yes"
Self-efficacy (Q4)	N = 13 7 (53.85%)	N = 99 62 (62.63%)	N = 67 58 (86.57%)	N = 218 180 (82.57%)	N = 67 45 (67.16%)	N = 409 286 (69.93%)
Family support (Q5)	N = 23 14 (60.87%)	N = 93 61 (65.59%)	N = 37 31 (83.78%)	N = 237 195 (82.28%)	N = 55 41 (74.55%)	N = 444 302 (68.02%)

Table 4.

Correlation between the variables "self-efficacy" and "entrepreneurial intention" (Q4–Q3) and between the variables "family support" and "entrepreneurial intention" (Q5–Q3) for the University of Ruse "Angel Kanchev", Bulgaria, respectively for 2019, 2021, and 2023. Source: INTERGEN.

one-third of the cases. In 2021 and 2023, there is a decline in entrepreneurial intention among people with a higher sense of self-efficacy and a sense of family support. In 2021, just over 82% of respondents sharing the feeling of self-regulation and support have a desire to start an entrepreneurial initiative. A correspondingly higher percentage—over 86% of those who define their skills as insufficient and over 83% of those who do not feel full support from their families—also demonstrate an entrepreneurial intention.

Similarly, **Table 5** reflects the influence of self-efficacy and family support on the entrepreneurial intentions of Romanian students. In all cases, respondents who believe in their efficacy and the support of their families have a much more developed entrepreneurial intention than their colleagues who do not share these feelings.

Figure 3 presents a visual comparison between the two educational institutions, Politehnica University Timisoara, Romania and the University of Ruse "Angel Kanchev", Bulgaria, regarding the correlation between "self-efficacy" and "entrepreneurial intention". Among UPT students, self-regulation, as a component of social intelligence, appears to be a much more significant factor for entrepreneurial attitude. Among URAK students, self-efficacy stands out as an influencing element in 2019 and 2023, while in 2021, the result is reversed. In 2021, students who lack a sense of self-efficacy demonstrate a higher percentage of entrepreneurial intent.

Figure 4 presents a visual comparison between the two educational institutions, Politehnica University Timisoara, Romania and the University of Ruse "Angel Kanchev", Bulgaria, regarding the correlation between "family support" and "entrepreneurial intention". For URAK students, family support will impact their entrepreneurial intentions in 2019. Still, the difference with the rest of the respondents—those who did not express conviction in their own capabilities—is less than 5%. In 2021, students who lack a sense of self-efficacy demonstrate a higher percentage of entrepreneurial intent. For UPT students, family support has a significant impact on students' entrepreneurial intentions, and this dependence is most noticeable in the data from 2023. The difference in the entrepreneurial attitude of students feeling family support and the rest is almost 25%.

Students' entrepreneurial intentions						
UPT'19			UPT'21		UPT'23	
	“No”/“Rather No”	“Yes”/“Rather Yes”	“No”/“Rather No”	“Yes”/“Rather Yes”	“No”/“Rather No”	“Yes”/“Rather Yes”
Self-efficacy (Q4)	N = 27	N = 105	N = 28	N = 229	N = 60	N = 186
	16 (59.26%)	69 (65.71%)	13 (46.43%)	162 (70.74%)	22 (36.67%)	126 (67.74%)
Family support (Q5)	N = 15	N = 134	N = 28	N = 264	N = 35	N = 237
	9 (60.00%)	81 (60.45%)	16 (57.14%)	185 (70.08%)	13 (37.14%)	146 (61.60%)

Table 5.
Correlation between the variables “self-efficacy” and “entrepreneurial intention” (Q4–Q3) and between the variables “family support” and “entrepreneurial intention” (Q5–Q3) for the Politehnica University Timisoara, Romania, respectively for 2019, 2021, and 2023. Source: INTERGEN.

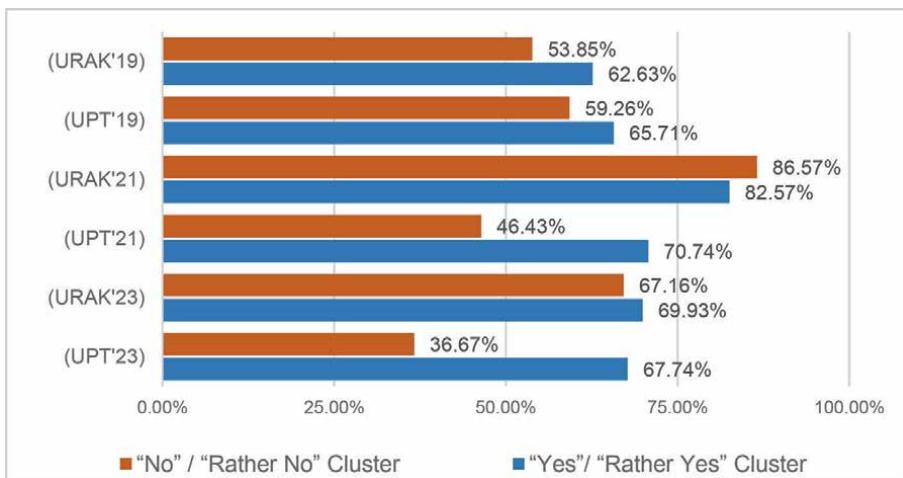


Figure 3.
Correlation between “self-efficacy-entrepreneurial intention” (Q4–Q3)—comparison between the students of the Politehnica University Timisoara, Romania and University of Ruse “Angel Kanchev”, Bulgaria, respectively for 2019, 2021, and 2023. Source: INTERGEN.

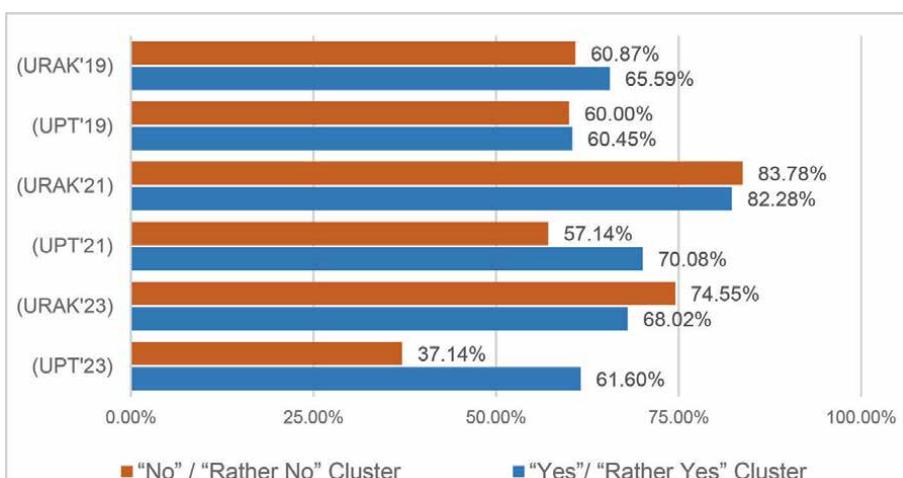


Figure 4.
Correlation between “family support-entrepreneurial intention” (Q5–Q3)—comparison between the students of the Politehnica University Timisoara, Timisoara and University of Ruse “Angel Kanchev”, Bulgaria, respectively for 2019, 2021, and 2023. Source: INTERGEN.

6. Discussion

A large part of the studies to date regarding the formation of entrepreneurial intention in students have focused on the environmental factor. They suggest that individual differences cannot influence students’ intentions. However, psychologists argue that an individual’s attitude can impact one’s intention, which in turn affects behaviour [7].

Other studies also support the idea that attitude can influence business start-up behaviour among graduates. Therefore, it is suggested that individual differences

should be examined to understand their effect on students' entrepreneurial intentions. In addition to this, it is emphasised that it is necessary to expand the theory or the direct relationship of "education and entrepreneurial intention" to include individual characteristics or psychological characteristics [7, 8].

The role of education is generally recognised as an engine for the development of individuals through imparting knowledge and skills. In this sense, universities are expected to stimulate the entrepreneurial intentions of students through various appropriate modules, improving and developing the entrepreneurial skills and abilities of graduates [7]. Entrepreneurship training, in particular, can be seen as a crucial element in encouraging the creation of new business ventures among budding entrepreneurs and thus help to reduce the level of unemployment and social inequality. Therefore, it is essential to know the factors shaping entrepreneurial intention.

Current research identifies the degree of influence of social intelligence on the entrepreneurial intention of the students—this identification is the gap that this research fills. The results show that the two predefined variables—*self-efficacy* and *family support*—have a different impact on respondents from Romania and Bulgaria. While the data for the first cohort are definitive, for the second, they are hesitant and require the search for additional answers.

The general picture shows that for the three studied periods—2019, 2021, and 2023—students from both educational institutions show a high degree of entrepreneurial intention. The data ranged from 56 to 83%. Both UPT and URAK saw the most significant growth in entrepreneurial intent in 2021, a period coinciding with the peak of the COVID-19 pandemic. In the same year, 2021, respondents from both Romania and Bulgaria, to the highest degree, demonstrated a sense of *self-efficacy* (72.70%-UPT; 75.50%-URAK) and *family support* (83.80%-UPT; 82.00%-URAK). Therefore, a positive relationship is observed between the set variables characterising the social intelligence of students and their entrepreneurial intention.

A closer look at the data shows that the positive relationship between *self-efficacy* and *entrepreneurial intention* is weaker among URAK students. In two-thirds of the cases, the correlation between *family support* and *entrepreneurial intention* is even with a negative relation. The results shown in **Table 4** indicate that students who fall into the category of *self-efficacy* and feel supported by their families have a high intention to start an entrepreneurial initiative. At the same time, the percentage of students who do not consider that their efforts alone are sufficient to start a business is similar.

On the other hand, the results of the study at UPT are categorical. **Table 5** demonstrates the positive correlation between the variable *self-efficacy* and *entrepreneurial intention* and between *family support* and *entrepreneurial intention*. Students who chose "Yes" and "Rather Yes" demonstrate a much higher degree of entrepreneurial intention compared to respondents who marked "No" and "Rather No".

The reasons for these results can be sought in different directions. One such is the prevailing business profile of URAK students. When choosing a major with a business direction, students from Bulgaria should already have a partially or fully formed entrepreneurial intention. In addition, students from URAK have solid theoretical training in the fields of business planning, business strategies, and entrepreneurship. This suggests that, in theory, this cohort of respondents is aware that self-confidence is not a sufficient condition for starting a business and achieving success. Therefore, other factors are already involved in the formation of their entrepreneurial intention. Such a conclusion does not discount the effect of *self-efficacy* and *family support* in the formation of *entrepreneurial intention*. Still, it demonstrates that the entrepreneurial purpose itself is a sum of multiple and different components.

Another reason can again be highlighted in the respondents' student profiles. As stated in Point 5 (Findings), students at the University of Ruse "Angel Kanchev", Bulgaria, are mainly from the Faculty of Business and Management (dominated by women), while at Politehnica University Timisoara, Romania, the respondents are mainly from the Faculty of Engineering (dominated by men). A 2022 study [24, 25] demonstrated that in first-year engineering students, self-efficacy to do well was significantly related to primary choice goals, controlling for interests and perceived likelihood of achieving a desired career. The authors of the same study make the finding that there is a significant discrepancy in the feeling of self-efficacy in both genders—men and women. It is also possible that women differ from men in how their self-efficacy beliefs are shaped and how they relate to career and life outcomes. Given the significant gender difference between the two universities, the presence of such a highly influential *gender-self-efficacy-entrepreneurial intention* relationship should not be overlooked [24].

Regardless of the identified unknowns, the study provides an answer to the first research hypothesis—*Family support, a sign of developed social relationships, is a critical factor in forming students' entrepreneurial intentions*. Family support is a significant factor in building entrepreneurial intention. This is categorically confirmed both by the general picture for all respondents and by the specific breakdowns by universities. The UPT data confirm the hypothesis to the maximum extent, and the URAK results, although debatable and asking new research questions, also confirm the existence of a relationship between the feeling of support and the desire to start a business.

The second research hypothesis—*Self-efficacy as a sign of students' social intelligence positively influences their entrepreneurial attitude*, also finds confirmation in the generated results. Similar to family support, self-efficacy emerged as a significant factor directly related to entrepreneurial intention. The comparison between the two universities reveals new unknowns—such as the gender and specialty of the respondents, which should be analysed in the study of entrepreneurial intention. At the same time, the analysis strongly confirms the family support-entrepreneurial intention relationship, and this relationship is more strongly defined among UPT respondents.

As stated in the literature review, social intelligence is a combination of multiple factors, including empathy, emotional intelligence, self-awareness, social skills, etc. Separately, some of these factors have been studied and applied in different models to determine the reasons for entrepreneurial intention. To varying degrees, positive correlations have been found between emotional intelligence and entrepreneurship on the one hand and empathy and entrepreneurship on the other hand. However, as a number of researchers point out, both empathy and emotional intelligence, although directly related to entrepreneurship, influence performance rather than the intention to start a business. The question arises whether these two variables—empathy and emotional intelligence—are enough or whether we need to look deeper into the factors that build entrepreneurial intention and attitude.

The present study analysed two such factors: *self-efficacy* and *family support*. Both factors are significant elements of the social intelligence construct. Self-efficacy encompasses aspects of self-awareness and self-regulation. At the same time, family support is part of social support and healthy social relationships.

The choice of the two factors is not accidental. Both self-efficacy and social support are intrinsic to socially intelligent people. However, while self-efficacy is an individual's internal strength, social support is receiving assistance from outside. An individual cannot guarantee that he will receive such support from family or individual members of society. He can hope, but not be sure, that he will be supported

in his entrepreneurial intentions. However, the present study of entrepreneurial attitudes among students from Bulgaria and Romania shows that social support by family members is the factor that has a more beneficial influence on the formation of entrepreneurial intention. It turns out that even if a person is confident in his knowledge, skills, and competencies, the identified social support has a more significant influence on his desires and behaviour.

Such knowledge opens up a number of possibilities for higher education institutions and their educational programs. Teaching and acquiring knowledge and competencies are not enough for the formation of a proactive and entrepreneurial-oriented society. It is essential that young people from an early age feel external support for their ambitions and goals. Such a conclusion implies that educational institutions could play a more responsible role in the formation of a more supportive community. Even if the family environment is not supportive enough, such a lack can be compensated by educational institutions, but only if they are willing to actively participate in building a proactive new generation of entrepreneurs.

In conclusion, the discussion and the confirmed hypotheses prove the central thesis of the study—*There is a relationship between social intelligence and the entrepreneurial intentions of students*. Both *social support* and *self-efficacy* are accepted in theory and practice as inherent in socially intelligent people. From this point of view, it can be confidently asserted that indirectly, through its components, students' social intelligence influences their desire and intention to start a business initiative. Given that the study was conducted within the international project INTERGEN, investigating socially oriented and intergenerational business initiatives, it can be concluded that the feeling of self-efficacy and family support has a direct impact on the formation of socially oriented entrepreneurial intention. That gives a reason to conclude that the social intelligence of the individual plays a vital role in the formation of socially responsible business ventures. Therefore, based on the findings of the study, efforts should be made to start or enrich already existing courses that develop social intelligence and sense of belonging among students.

7. Conclusion

Investing in the social intelligence of young people is a critical factor in building a more sustainable, just, and prosperous society. Endless global crises demand continuous flexibility and innovation from the business units that shape the economy. They also require adequate social skills, including empathy, emotional intelligence, and creativity. Social economy and socially responsible entrepreneurial initiatives cannot be implemented by people devoid of compassion, goodwill, and, above all, the desire to solve the most challenging and intractable problems of society.

The research proves that the cultivation and promotion of social intelligence and critical factors such as social support and self-efficacy are essential to stimulating entrepreneurial intention among young people. The comparative analysis between students from Romania and Bulgaria shows that higher levels of social intelligence are associated with stronger entrepreneurial intention. The authors of the study correctly emphasise the need to study additional factors, including gender and the student's educational majors.

In addition, the results highlight the need to develop educational programs that promote social intelligence and entrepreneurial thinking, create policies that stimulate socially responsible entrepreneurship, and provide resources that support the

development of social skills and entrepreneurial ideas. Furthermore, the study reveals engaging differences between students from Romania and Bulgaria, which stimulates the initiation of future research. In conclusion, the study contributes to the understanding of the factors that promote entrepreneurial intention among young people and enriches the theory of management and entrepreneurship. At the same time, the data complement the theories presented in the literature analysis regarding the relationship between social intelligence and entrepreneurial intention.

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Author details

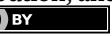
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Chapter 10

Digitisation of Entrepreneurship Education in Uganda: Challenges and Opportunities

Ernest Abaho, John K. Mukiibi, Dennis Oketa, Pius Ogwal and Ojok Joseph Ceaser

Abstract

In recent years, Uganda has witnessed a significant shift towards entrepreneurship education and the adoption of digital technologies in various sectors of the economy. Entrepreneurship education has seen notable progress, as the country recognises the importance of equipping its citizens, especially the youth and women, with the necessary skills and knowledge to thrive in the digital era. This chapter is based on the intervention to increase access to entrepreneurship and business skills among students at universities and technical and vocational education institutions in Uganda. The intervention aimed at creating more graduate startups through hands-on skilling based on online platforms and mentorship, as well as strengthening work readiness among the students. This chapter hence presents the observed challenges that are faced by Ugandan students in accessing digital entrepreneurship training and experiences from the pilot phase of the intervention. The chapter objectives included sharing the Uganda experience in the adoption of digitised entrepreneurship content, which is delivered using computer-aided tools in self-paced environments. This will help share experiences and best practices that can be useful to other institutions that offer entrepreneurship and business development skills, especially to underserved student communities as well as learners with disabilities.

Keywords: entrepreneurship education, eLearning, higher education institutions, work and business readiness, business skills, graduate startups

1. Introduction

1.1 Background

eLearning, a key component of the 21st digital economy, forms the basic element in the provision of digitisation in entrepreneurship education and has widely been considered in many advanced countries where technological systems have been established to make it happen. Thus, the preparedness of Uganda and other low-income countries to embrace the same system is well-positioned. In Uganda, the eLearning system in higher education has been partially implemented but only in a few higher

education institutions. In general, eLearning, together with other approaches to the use of ICTs in education has been signalled as a powerful tool for supporting the knowledge and skills required in Uganda's transition from being agricultural to an industrial economy and could potentially have a major impact on the education system and society more generally.

As such, now more than ever, the demand for eLearning has become a crucial element in academic provision across all levels of education. Thus, this book chapter discusses the status of the implementation of digitisation in entrepreneurship education in Uganda, with special reference to eLearning. The shift to eLearning therefore is being fuelled by various factors, including the growing volume of intellectual property content on entrepreneurship, the push towards eco-friendly educational practices to meet climate change goals, cost-saving measures on institutional stationery, and the enhanced benefits of archiving and sharing educational resources.

Furthermore, eLearning from an institutional development standpoint fosters the internationalisation of academic programmes and facilitates easier access to global education opportunities while helping students to save on travel expenses through collaborations between institutions and students. Locally, eLearning plays a vital role in providing learners with flexible learning schedules [1].

The focus of this chapter lies in a project being undertaken by Cyber School Technology Solutions (CSTS) in partnership with the Mastercard Foundation in Uganda. Headquartered in Kampala, Uganda, CSTS is a global leader in online education systems, specialising in designing and developing digital educational resources, portals, and learning management systems. Their collaboration with the Mastercard Foundation aims to enhance educational opportunities for the youth in Uganda.

1.2 History of entrepreneurship in Uganda's higher education

The history of entrepreneurship in Uganda's higher education demonstrates a clear development. Initially, entrepreneurship was taught as part of the broader subject of "Commerce" at the lower secondary level of education. However, in the academic year 2003/2004, Makerere University Business School introduced the first standalone academic programme in entrepreneurship called "Bachelor of Entrepreneurship and Small Business Management." This move was driven by the growing demand for skilled managers and graduate entrepreneurs in the thriving Micro, Small, and Medium Enterprises sector which significantly contributes to Uganda's Gross Domestic Product and employment landscape. After all, MSMEs play a crucial role in value chain supply for sustainable economic growth with their GDP contribution standing at 18%, and their employment and job creation rising to 90% irrespective of age and gender [2].

Subsequently, in the academic year 2007/2008, Makerere University Business School further advanced the field by offering a Master of Science in Entrepreneurship. This academic evolution was followed by the introduction of entrepreneurship programmes at other institutions, such as Uganda Christian University and Kampala International University. The discipline's popularity has grown steadily since then, with Technical Vocational Education and Training institutions also incorporating entrepreneurship education as part of the strategies for strengthening the application of vocational skills in value addition for self-employment and innovation advancement.

As highlighted by Ohagwu et al. [3], there is a strong relationship between vocational and entrepreneurship skills, with each complementing the other.

This connection underscores the importance of integrating vocational training with entrepreneurship education to stimulate innovation and enhance productivity [4], a viewpoint also supported by the United Nations Educational Scientific and Cultural Organisation-International Centre for Technical and Vocational Education and Training UNESCO-UNEVOC [5]. Recognising the pivotal role of entrepreneurship in vocational training, the Uganda Technical Vocational Education and Training (TVET) Policy of 2019 [6] aimed to establish business incubation and innovation centres in TVET institutions and enhance the apprenticeship system to bolster entrepreneurship and other facets of TVET.

The development of entrepreneurship education in Uganda has now extended to the doctoral level, cultivating a cadre of experts in fields such as innovation, business development, and incubation service providers and researchers. This growth has also spurred an increase in localised content through case studies and support initiatives, including the formulation of the National Startup Policy for Uganda of 2024 (which is awaiting government approval).

Moreover, the involvement of non-state actors, such as the Mastercard Foundation Uganda and other implementing partners, underscores the growing significance of digitising entrepreneurship education in the country. Through collaborations with TVETs and universities, these interventions are instrumental in improving access to essential entrepreneurship and business skills for students, further enhancing the entrepreneurial ecosystem in Uganda.

1.3 Research objectives of the chapter

- i. To present experiences of eLearning adoption on the entrepreneurship curriculum using evidence of the Uganda eLearning initiative.
- ii. To present the challenges encountered by learners and institutions in adopting eLearning.
- iii. To present recommendations that can be adopted to foster the adoption of eLearning in higher education.

2. The digitisation of entrepreneurship education and skilling

Transitioning to digitised learning methods has introduced a new paradigm in education, particularly in the realm of entrepreneurship. This transformation is largely driven by the concepts of eLearning, m-learning (learning through mobile devices, and Device-to-Device Learning (D2D). E-learning, encompassing online and offline learning modalities facilitates virtual interactions and offers flexibility in learning. It encompasses various forms ranging from app-based and internet-based learning to CD and PlayStation learning. On the other hand, m-learning focuses on mobile device-based learning, enhancing accessibility and convenience. The shift from digitisation to digitalisation, or D2D, revolutionises traditional educational practices by embracing virtual modes of education delivery.

By embracing Technology-Enhanced Learning (TEL) designs, entrepreneurship education in Uganda can leverage these digital advancements to revolutionise teaching and learning methodologies, catering to diverse educational needs and preferences [7]. In addition, by embracing eLearning, which utilises a variety of technologies and

user-centric approaches, aspiring student entrepreneurs can access a wealth of educational content and assessment tools on the eLearning platform. This approach enables convenient learning opportunities, updated knowledge resources, and interactive study materials, ultimately enhancing the overall learning experience [3].

The digital transformation of entrepreneurship education in Uganda opens up new avenues for individuals to pursue their entrepreneurial aspirations [8]. Through online resources, collaborative platforms, and innovative teaching methods. Uganda can empower its citizens with the necessary skills and knowledge to succeed as entrepreneurs in a digitally driven world. This shift towards digitisation not only supports economic growth and innovation but also fosters inclusive opportunities for all Ugandans to thrive in the entrepreneurial landscape [8].

3. The theory behind eLearning

The theory of eLearning is about designing educational technology used to promote effective learning by reducing extraneous cognitive study load at different students' levels. It can be challenging for educators to design tasks at an appropriate level for students; the eLearning theory model can help instructors understand how cognitive load can be categorised and combined with design principles to make effective learning with technology. As argued by ref. [9], the success of technology is driven by user acceptance. Based on this, the adoption of eLearning can be explained by the Technology Acceptance Model. The model was developed by ref. [10] and is premised on three perspectives; i) ease of use, ii) usefulness, and iii) user attitude. Accordingly, the model is based on the following assumptions;

- a. Users can accept or reject a technology depending on their level of motivation to use it.
- b. Users can adopt or reject a technology depending on its functionality including but not limited to the features and usability.
- c. Users can accept a technology if they have the capability to use it to solve their problems.

These assumptions are relevant because they focus on the key antecedents of de-constraining online education which is part of the digitisation agenda of entrepreneurship. While [9] stresses that the model lacks sufficient rigour and relevance, it has contributed to the understanding of the key success factors for technology adoption. From the context of digitisation of entrepreneurship training, the model presents perspectives on how to attract students, institutions, and facilitators to intensify the adoption of self-paced eLearning using the content that was developed by the project.

4. Project overview: the Uganda eLearning initiative

4.1 Background of the project

The five-year Cyber School- Mastercard Foundation Uganda eLearning Initiative seeks to improve access to quality and relevant education for 95,000 youth, 50% of

whom are women across 21 Higher Education Institutions (HEIs) that include universities and TVETs. The project's goal is to transition 12,500 of these students into dignified and fulfilling work by 2026, significantly impacting the education system by creating a responsive training environment that equips young people to the workforce.

To ensure the effectiveness of this initiative, the project is being rolled out in two distinct phases, beginning with an initial pilot phase that was finalised in May 2024, and targeted seven (7) institutions, specifically Business Technical and Vocational Educational Training Institutions (3), and Universities (4).

4.2 Motivation behind the project

The COVID-19 pandemic had a profound impact on educational systems globally, resulting in widespread closures of schools, universities, and colleges to mitigate virus transmission [11, 12]. In Uganda, approximately 15 million learners were forced to stay home during the second wave of the pandemic, with around half a million tertiary institution students affected, including 250,000 university students [13]. The closure of educational institutions not only affected students, teachers, families, and schools themselves in terms of learning and income [14] but also carried significant economic and societal consequences, particularly for disadvantaged families [15].

To adapt and survive, a few privately owned educational institutions in Uganda shifted some of their operations online. However, many of these online systems were initially limited in functionality, relying primarily on platforms such as WhatsApp, Zoom, Teams, and Google Meet, which do not offer an optimal user experience for both students and teachers. Notably, urban universities with private ownership were better equipped and experienced in transitioning to e-learning compared to rural-based universities. This has led to a growing digital divide, where students from lower-income, rural areas, females, and those with disabilities face challenges in accessing online education due to limited internet access and devices like smartphones, tablets, and/or laptops.

In response to these challenges, the Uganda eLearning initiative embarked on a journey to strengthen the resilience of Education Institutions (EIs) beyond mere survival. The initiative focuses on enhancing eLearning capabilities, providing digital skills training for instructors and students, and addressing various project areas such as gender inclusion, safeguarding, capacity building for institutions and personnel, as well as promoting work readiness and entrepreneurship skills. Importantly, the project is designed to specifically benefit lower-income youth, refugees, women, and persons with disabilities by addressing learning obstacles through assistive devices, sign language integration, mentorship programmes, internships, scholarships, and instructor training in social-emotional learning (SEL).

4.3 Targeted outcomes of the project

The interventions were founded on two primary outcomes addressing the project needs in six intervention areas namely;

- a. Enhanced access to market-responsive education and training systems by integrating work readiness and entrepreneurship skills, thereby fostering increased opportunities for students in the job market and graduate business startups.

- b. Improved quality of online education and skilling in Education Institutions through the implementation of innovative teaching approaches, interactive learning platforms, and ongoing professional development for Instructors, leading to enriched educational experiences and enhanced learning outcomes for students.

4.4 Intervention activities

The project has been conducting specific activities towards the realisation of the eLearning adoption and its beneficial impact. These activities include the development of content, digitisation of the content, development of the e-learning platform, and supporting the stakeholders as detailed below.

- a. Development and adoption of work readiness and entrepreneurship skills courses.
- b. Deployment of Online Learning and Management System (LMS) platform for Educational Institutions.
- c. Training of instructors in digital pedagogy and instructional design, content development, and online acquisition.
- d. Increasing access to affordable internet and devices for learners, mentors, and coaches.
- e. Supporting Educational Institutions in the development, adaptation, and implementation of eLearning policies, and general Institutional capacity building.
- f. Supporting the transitioning of youth into work through internships and work-study programmes.
- g. Sensitive programming, gender mainstreaming, and safeguarding of beneficiary persons with disabilities and learners with special needs.

4.5 Partners involved in the project

The CSTS Uganda eLearning initiative is being implemented in Partnership with Mastercard Foundation, Government of Uganda (GoU), Kyambogo University, Mbarara University of Science and Technology, Nkumba University, Busitema University, MAT Abacus Business School, Uganda Rural Development and Training Institute, Lokopio Hills Technical Institute, Uganda Manufactures Association, Federation of Uganda Employers, Mastercard Foundations' Young Africa Works partners, such as Private Sector Foundation Uganda (PSFU), Ripple Effect, Equity Bank, GOAL Uganda, Innovation Village, Gudie Leisure, World Found Programme, Children's Rights and Violence Prevention Fund, Financial Sector Deepening Uganda, War Child Canada, and Uganda National Social Security Fund. These partnerships are aimed at fulfilling the project aim of supporting 95,000 (50% women) youth with 12,500 transitioning into dignified and fulfilling employment by 2026 through eLearning initiatives (**Table 1**).

SN	Educational institution	Type	Population	Region
1.	Busitema University	University	4000	Eastern
2.	Kyambogo University	University	1200	Central
3.	Mbarara University of Science and Technology	University	3916	Western
4.	Uganda Rural Development and Training Institute	BTVET	407	Western
5.	Lokopio Technical Institute	BTVET	417	West Nile
6.	Nkumba University	University	3000	Central
7.	MAT Abacus Business School	University	1500	Central
Total Participants			14,440	

Table 1.
Institutions that are benefiting from Phase I.

5. Methodology for developing the entrepreneurship content

The digitised content was developed specifically for this project. The content comes under the course titled “Entrepreneurship and Business Skills”.

As part of the project preparation, extensive consultations were made to gather insights from various stakeholders. These consultations involved key regulatory bodies in the education sector, including the National Curriculum Development Centre responsible for developing curriculum standards for pre-primary, primary, and secondary education. Further consultations included the National Council for Higher Education, mandated with overseeing the quality and compliance of higher education

Stage	Stakeholders	Description
Needs Assessment	Regulators, Students, Educationists, FUE, UMA, and PSFU	A comprehensive analysis to understand the relevant skills needed to boost entrepreneurship education and identify key areas for curriculum improvement.
Curriculum Design	NCHE, NCDC, DIT, Educationists	Development of entrepreneurship curriculum that integrates eLearning to align with twenty-first-century skills.
Review and Feedback	Students, NCHE, NCDC	Feedback from students and regulatory bodies to ensure the curriculum met the required standards and addressed emerging skill needs.
Continuous Professional Development	Employers, Instructors, and students	Mentorship and upskilling of Instructors on pedagogical skills.
Piloting the curriculum via the Learning Management System (LMS)	DIT, UBTEB, Educationists	The curriculum was tested in select four (4) institutions (i.e., two BTVEPs and two Universities) to assess its relevance and make necessary revisions based on feedback.
Implementation, Monitoring, Evaluation, and Learning.	CSTS, Uganda eLearning Programme	Mechanisms to implement, and monitor the learning process, evaluating impact, and continuous improvements based on outcomes.

Table 2.
Itineration of the online content development.

academic programmes, accrediting academic programmes, and aligning them with skill needs and employment opportunities in the labour market.

The Directorate of Industrial Training, a quality assurance directorate in Uganda offering recognised quality assurance services for Business, Technical, Vocational Education, and Training (BTVET) was also among other stakeholders engaged as well as the Uganda Business and Technical Examination Board, mandated by Ugandan law to regulate, coordinate, and administer national technical and vocational



Figure 1.
Key informant discussions.

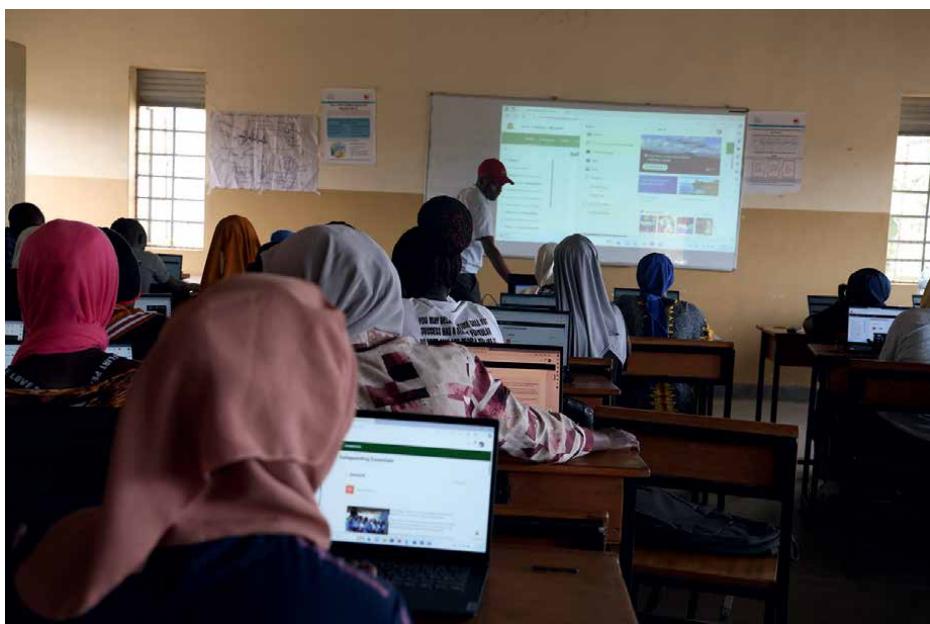


Figure 2.
Institutional visits and learning environment.

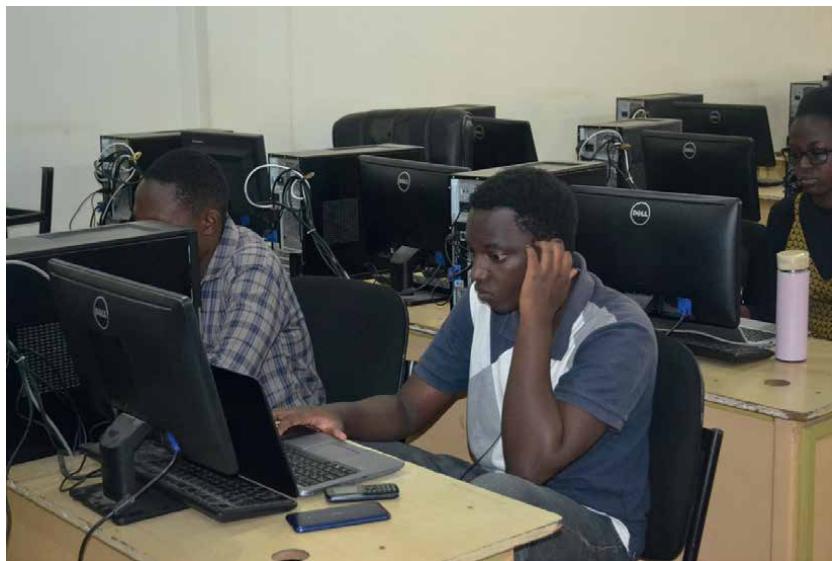


Figure 3.
eLearner testing the entrepreneurship and skills course content.

examinations by awarding Certificates and Diplomas in Business, Technical, Vocational, and specialised education.

The inclusion of these stakeholders in the consultations was purposed to evaluate the eLearning initiative's potential impact in enhancing the employability and entrepreneurial readiness of students in higher education. The consultations also helped in quality assurance to assess the relevance, appropriateness, and value of the proposed intervention in preparing students for success in the evolving landscape of work and entrepreneurship. Please note that all the photos used in this chapter have been taken with consent (**Table 2; Figures 1–3**).

6. Project impact

This chapter is based on the case of the Uganda eLearning Initiative project. The project is still ongoing but has registered a degree of progress and success. In this section, the registered impact is presented.

Entrepreneurship education through eLearning, and indeed any other form of educational delivery system in Uganda is still in its infancy, even when promising strides have been made. As such, the pilot phase of the digitisation of entrepreneurship curriculum involved consultations, implementation, monitoring, evaluation and was conducted in a staggered manner between September 2023 and May 2024 in seven (7) Education Institutions¹ to test the feasibility and effectiveness of the curriculum and its alignment to the foundational outcomes of the eLearning Initiative.

Significant progress was made in the areas of eLearning policy development with a total of 82 (28 Females; 54 Males) top leaders, supervisors, Instructors, and administrators skilled together; 51 (14 Females; 37 Males) of whom had participated

¹ Kyambogo University, Nkumba University, Mbarara University of Science and Technology, URDTI, LHTI, Mat Abacus Business School and Busitema University.

in a kick-off workshop to appraise eLearning and mindset change impacted through skilling. As such, to date, key outcomes such as enhanced capacity and Institutional flourishing have been observed. These outcomes leverage opportunities for transformative advancements in educational delivery and sustainable accessibility. Learning management infrastructures for MAT Abacus Business School, Lokopio Hills Technical Institute, and Kyambogo University were set up, whereas the learning management systems of Uganda Rural Development and Training Institute, Nkumba University, Busitema University, and Mbarara University of Science and Technology were upgraded to ensure an effective learning environment using the Entrepreneurship and Business Skills curriculum.

As a result, an improvement in the enrollment of students on the LMS across the different Educational Institutions from a baseline figure of 2897 to 16,530 students enrolled altogether by the end of the pilot period in the entrepreneurship and business skills course content, indicating an increased access to learning resources by 13,633 students across the pilot timeline which is 470.6% growth in the adoption of eLearning on entrepreneurship and business skills. This implies that there is increased access to entrepreneurship skills and hence more potential for graduate business startups.

With reference to **Figure 4**, the pilot testing phase targeted a total of 2899 participants to complete the skilling courses. Only 833 student participants completed the course and 80% of the modules were completed within the pilot timeline averaging an overall 30.5%. It was notable during monitoring that the personalised approach to learning comes with its challenges, and some challenges were personal in nature while others were environmental in nature.

It became apparent that the willingness and commitment of the BTBET and Universities varied as reflected in the outputs of the Educational Institutions. The BTBETs had little or no prior exposure to eLearning platforms before the project. However, produced relatively interesting outputs as compared to the Universities by the standards. This changed the mindset that most BTBETs had especially believing that eLearning cannot apply to practical courses.

Integrating skilling interactions with the experience of accomplished business professionals together with personalised learning strategies for the Entrepreneurship and Business Skills course are observed to ensure that educational institutions enhance student engagement significantly. This collaborative approach resulted in a more immersive, practical, and enriching educational experience for students, leading to a higher completion rate of the digitised Entrepreneurship and Business Skills course, and effectiveness in equipping future entrepreneurs and risk-takers.

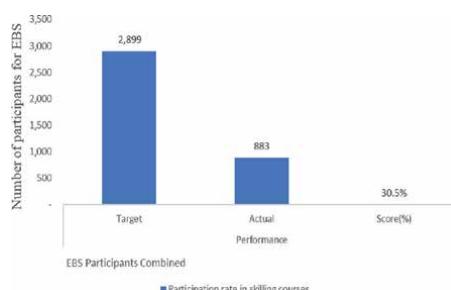


Figure 4.
Participation in skilling course entrepreneurship and business skills course.

This can be attributed to an approach applied to trainees at Uganda Rural Development and Training Institute whose experience with accomplished business persons at the Kyaka II refugee settlement, resulted in a high uptake of the course scoring 173% (230) against an initial target of 133 trainees. Importantly, this methodology transcends disciplinary boundaries, preparing individuals across various fields for entrepreneurial startups within their respective domains of academic specialisation.

Key lessons learned from the implementation and monitoring of the pilot interventions pointed to the fact that some of the instructors with high interest in participating in the digital pedagogy, content development, and Instructional design practices had not experienced any intensive or professional training in the past in the same area. This practice has contributed immensely towards progress in the area of entrepreneurship as a maiden eLearning course.

The implementation of the eLearning Initiative highlighted that the project significantly amplified the digital exposure and communication practices at Lokopio Hills Technical Institute. Currently, at least 85% of the students own smartphones for m-learning, and laptops and have gained access to online communication tools, such as WhatsApp, Facebook, LMS chatbot, etc., a notable increase compared to the initial stage of the project in the area that was faced with lack of electricity to power the eLearning gadgets.

To enhance access to Entrepreneurship and Business Skills content through the Learning Management System platform, the feasibility and effectiveness of *Eduroam* internet access were tested through two metrics such as; usage analytics of *Eduroam* internet access² and participant feedback on internet service quality.

The analysis revealed that the usage analytics of *Eduroam* internet access fell short at 22.1% against a target of 8516 participants, while only 16.3% of participants found the internet service quality satisfactory. This is because there was a notable lack of familiarity among students with the differences between *Eduroam* internet access and the regular internet service available at the institutions. Furthermore, challenges in technical proficiency were observed among many participants due to skilling initiatives targeting a limited number of learners to provide support to others in terms of access. However, these challenges were mitigated by the provision of the LMS support, and eLearning Officers stationed at the educational institutions (**Table 3**).

The low usage is attributable to a lack of general awareness among participants (students and facilitators) about the benefits of *Eduroam* internet access and confusion regarding the distinction between Eduroam and institution-provided internet services. Connectivity issues, slow speed, and inconsistencies in service provision may have contributed to the dissatisfaction with internet service quality, impacting the overall learning experience.

Metric.	Performance		
	Target	Actual	Score (%)
Usage analytics of <i>Eduroam</i> internet access.	8516	1886	22.1
Participant feedback on internet service quality.	2898	472	16.3

Table 3.
Feasibility and effectiveness of Eduroam data internet access.

² <https://eduroam.org/c>

As such, by implementing awareness campaigns and strengthening the monitoring of internet service quality, education institutions can address the challenges related to *Eduroam* internet access, enhance internet service quality, improve technical proficiency among participants, and create a supportive learning environment conducive to successful eLearning implementations.

7. Challenges faced by institutions in adopting eLearning

In this section, a summary of challenges faced by institutions in adopting e-learning is presented. This is categorised between learners and institutions.

7.1 Institution-based challenges

- i. Limited ICT infrastructure such as computer laboratories at Educational Institutions. This was observed across all the institutions in the pilot phase (Kyambogo University, Nkumba University, Busitema University, Lokopio Hills Technical Institute, Uganda Rural Development and Training Institute, Mat Abacus Business School, Mbarara University of Science and Technology).
- ii. Lack of access to stable electricity supply and inconsistent power supply at Lokopio Hills Technical Institute, and Uganda Rural Development and Training Institute.
- iii. Negative mindset by learners and facilitators towards eLearning. This was observed at all institutions.
- iv. Overloaded academic curriculum which leaves limited time for learners to access the extra-curricular courses.
- v. Lack of ICT facilities for learners with disabilities such as the deaf, the blind, and comprehension. This challenge is prevalent at all institutions.
- vi. High costs of developing eLearning content
- vii. High costs of eLearning software and licencing

7.2 Challenges faced by learners

- i. Lack of orientation towards eLearning
- ii. Academic work overload
- iii. High costs of data and gadgets
- iv. Digitised courses not in the Semester timetable
- v. Low levels of technical support for students
- vi. Low Instructor confidence in teaching online

- vii. Low computer and digital literacy in TVETs and Universities
- viii. Reliability of the LMS is not guaranteed.

8. Conclusion

The digital revolution has altered the way education is delivered and accessed. This has presented innovative opportunities for students with high entrepreneurial potential to acquire the skills and knowledge needed to succeed in the competitive business landscape. This shift towards digitisation in entrepreneurship education in Uganda can be attributed to several factors such as the growing availability of affordable gadgets such as smartphones and resources such as internet connectivity. However, some institutions are still faced with accessibility and affordability challenges.

This has enabled aspiring student entrepreneurs in remote and underserved areas to participate in entrepreneurship education programmes through online platforms and virtual learning environments. Another key antecedent to the speedy adoption of eLearning is the support from the government and initiatives that foster the importance of promoting entrepreneurship as a key driver of economic growth and development. Various initiatives and programmes have been implemented to support entrepreneurship education and encourage the adoption of digital technologies in learning. For example, the Ministry of Education and Sports has introduced policies to integrate digital tools and resources into the curriculum [16].

Collaborations with private sector partners such as technology companies, and startups to enhance entrepreneurship education through digitisation partnerships have led to the development of online courses, webinars, mentorship programmes, and virtual incubators that provide aspiring entrepreneurs with practical skills and guidance on starting and growing a business. Such partners in Uganda include MTN Uganda which supports institutions with zero-rated access to the internet.

Overall, the digitisation of entrepreneurship education in Uganda has the potential to revolutionise the way entrepreneurship is taught, learned, and practiced. By leveraging digital technologies and resources, Uganda can equip students with the skills, mindset, and tools needed to thrive as successful entrepreneurs in the digital age.

The Uganda Education Policy Review Commission needs to consider the inclusion of digital platforms in educational institutions and consider a deliberate intervention to support lower-level schools and higher education with eLearning infrastructure.

8.1 Limitations and suggestions for further research

The chapter presents evidence from a project which is driven by resource support and this may not be the same case for institutions that do not have resource support. Future research can make a comparison between institutions with project support and those that operate without such support. This will help to identify the level of difference between resource-rich environments and those that have to use their own resources.

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Conflict of interest

The authors declare no conflict of interest.

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Chapter 11

Entrepreneurship Education

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Abstract

Entrepreneurship Education (EE) is seen as an important element for entrepreneurial propensity and start-up venture creation. At the same time, there is a wide consensus that entrepreneurship is associated with job creation and economic development. However, because EE is still a relatively new field of study in its exploratory phase, significant research gaps remain. This chapter aims to present an overview of EE concerning important aspects such as its link with entrepreneurship development, entrepreneurial teaching techniques, entrepreneurial competencies, topics to be approached, and discussions regarding important directions of entrepreneurship development to critically systemise core aspects of this concept. Results indicate EE is a broad, multidimensional, and complex topic. The findings of this chapter help direct further research and curriculum design to maximise results obtained in fostering EE among students.

Keywords: EE, development of entrepreneurship, competencies, entrepreneurship courses, taxonomy

1. Introduction

In the last decades, entrepreneurship has been increasingly regarded as a critical factor for generating employment, stimulating economic growth, and improving standards of living [1–3]. This view is shared at a global level, with governments from all continents choosing to adopt various measures and incentives to support entrepreneurial venture creation. In the current post-COVID-19 context, with the increasing trend for digitalisation and the development of artificial intelligence, future entrepreneurs are expected to seize opportunities and navigate challenges.

Entrepreneurship as an activity and career choice involves “the discovery, evaluation, and exploitation of opportunities to introduce new goods, services, and processes to the market” [4]. It requires individuals to assume personal and economic risks and to use their creativity in an environment of ambiguity with limited resources [5]. The same author points out that young people engaging in entrepreneurship activity face the challenge of a lack of social experience and connections, as well as lower maturity levels when compared with their older counterparts.

To foster entrepreneurship and support successful business establishment and growth, governments across the world have adopted different fiscal and legislative

measures and chosen to invest in supporting the development of entrepreneurial education (EE), regarded as a core element in fostering entrepreneurship. This has also led to the development of a new field of study that aims to explore the role played by EE in fostering entrepreneurship development, as well as identifying crucial competencies that entrepreneurs should hold to be able to successfully create and manage a business.

EE refers to the curricula by which providers of education and training aim to support participants in acquiring relevant knowledge, skills, and competencies to allow them to successfully start and manage a business. At the same time, because EE is a relatively new field of study, significant research gaps remain [1]. Researchers agree that more in-depth studies and analyses are required to achieve a sound knowledge base in this area so that findings can best guide practitioners in developing relevant curricula. Some of the research gaps identified include high result variability with often contradictory results regarding the impact of EE on entrepreneurial intention, still limited longitudinal studies on the impact of EE on venture creation, and limited studies focused on centralising, ordering, and classifying trends in entrepreneurship teaching, skills, and abilities, or teaching methods.

The chapter that we propose aims to offer readers an overview on EE to support a sound initial understanding of the concept that can then guide further research.

The main research objectives of this chapter are to:

- Present an overview and describe the concept of EE and its multidimensional nature;
- Explain the connection between EE and entrepreneurship intention;
- List the most important components clustered in schools of entrepreneurship;
- List the latest entrepreneurship teaching techniques and explain the advantages and disadvantages of these techniques;
- Explain critical entrepreneurial competencies for entrepreneurs as a guide to the EE process;

This chapter is addressed by both researchers and practitioners in the field of EE, from public organisations, educational institutions, NGOs dealing with entrepreneurship, to any other public or private bodies interested in supporting the development of entrepreneurial knowledge, skills, and abilities to foster start-up creation and entrepreneurial attitudes. The content of this chapter is structured to offer anyone interested in understanding EE a critical analysis and synthesis of EE concerning the following:

- the connection between EE and entrepreneurship development;
- the most important direction from the schools of entrepreneurship;
- the most important techniques used in EE considering their strengths and weaknesses;

- critical competencies for entrepreneurs in the context of current and future economic, technological, and societal challenges and opportunities;
- emerging trends and their influence on the topics that EE should approach to develop the relevant mindset and attitudes conducive to venture establishment.

The chapter concludes with a summary of findings and concrete suggestions for researchers and practitioners interested in advancing this domain.

2. The connection between EE and entrepreneurship development

EE refers to the different courses and curricula that providers of training, including universities, should deliver to enable participants to acquire relevant knowledge, skills, and competencies in entrepreneurship. Such competencies could include identifying opportunities, integrating resources, and developing ventures [5]. The authors also emphasise the role played by EE in promoting critical thinking and a sense of self-worth [6] and the role it plays in helping participants develop entrepreneurial thinking and skills that can be applied in other fields of activity [5, 6]. According to [7], as quoted in [1], the overall goal of EE is to determine an increase in participants' intention to engage in entrepreneurial behaviour.

As a concept, EE is multidimensional concept, with many particularities that researchers are still trying to understand. In this section, we will focus on discussing the connection between EE and entrepreneurship development/intention. To achieve this, it is important that we understand the complex nature of EE. Firstly, [1, 2] emphasise the different perspectives that exist between education "for", "in", "about", and "through" entrepreneurship. Education "for" entrepreneurship refers to curriculum addressed at individuals who want to start or run a business, while education "in" entrepreneurship focuses on the more practical aspects of entrepreneurship and emphasises a more hands-on approach to learning where participants simulate businesses and act as entrepreneurs. This type of education focuses on developing participants' ability to "move from idea recognition to creating value for customers" [1]. Education "about" entrepreneurship focuses on the academic perspective where participants "explain and understand entrepreneurship" [1], while education "through" entrepreneurship focuses on a much broader perspective emphasising an entrepreneurial attitude that can be used to address larger societal issues.

Secondly, we need to consider the link between EE and entrepreneurial traits that are developed among students. For, as opposed to other disciplines, EE is focused not only on teaching the hard skills associated with starting a venture (i.e., legislative aspects, business planning, financial calculations, etc.) but also on developing among students a set of attitudes and behaviours which they can apply during their future careers as entrepreneurs [2].

Thirdly, research has shown that EE is connected with psychological traits, and these traits should be considered when designing course curricula because they mediate the connection between EE and entrepreneurial intention (EI) [1, 2].

EI is "the subjective state of mind of potential entrepreneurs that determines whether to engage in entrepreneurial activities" [5]. Studies so far indicate an ambivalent view regarding EE and its role in supporting entrepreneurial intent [1, 2]. Studies having identified a significant positive correlation between EE and EI suggest

EE should continue and is essential to improve the EI of university students, but also indicate the existing of mediating variables such as psychological traits. Regarding the variability in results, [2] argues this could be attributed to the lack of consideration for mediating variables, while [6] suggests this could be caused by poor methodology or the diversity of programmes, lengths, and samples used. Such mediating variables identified include, although not limited to: inspiration, social network, and knowledge and skills. According to [1, 6] also indicates the existence of an alignment effect, which explains how “students with low EI at the beginning of the course will increase their entrepreneurship intention because they might find something they would enjoy in entrepreneurship [while a contrary effect will be present for] students with high entrepreneurship intention before the course, who will acquire a more realistic view on entrepreneurship”.

Studies indicating a significant relation between EE and EI include meta-analyses [1, 6, 8], as well as studies covering different geographical areas including China [5] to South America [3] or Sub-Saharan Africa [2].

The following implications for researchers and practitioners were identified:

- university entrepreneurship curricula to include compulsory, elective, and practical courses in entrepreneurship which also consider national contexts [5];
- psychological traits related to entrepreneurship should be considered when developing course curricula to test trait levels and foster their development. Teaching strategies and course design should be revisited to care for these traits [1, 2];
- there is a need for more research analysing the impact of EE regarding entrepreneurship development with a strong focus on methodological aspects, especially applying pretest-post-test designs with control groups, while also focusing on ensuring representative stratified sampling [6];
- the implications of entrepreneurship training should be communicated to educators to enable continuous improvement of EE [2];
- the emotional, social, and rational components of entrepreneurship should be considered when designing course content to allow such courses to inspire students (e.g., via guest lecturers and success stories), help them build support networks (e.g., via internships, entrepreneurship events, and boot camps, etc.), and acquire relevant knowledge and skills (e.g., via theoretical and practical tasks) [1].

To conclude, existing research demonstrates a significant yet complex relationship between EE and EI, where mediating psychological variables play an important role in better understanding drivers for EI and support researchers and practitioners to best design curricula that foster entrepreneurship. This highlights the importance of integrating these psychological insights into educational strategies to effectively nurture entrepreneurial mindsets and skills.

3. Entrepreneurial directions from school of thought

EE is a complex, multidisciplinary, and dynamic field characterised by different stages of development. A plethora of directions, clustered in schools of thought

concerning EE, shed light on various features of entrepreneurship; prioritising certain key elements to equip learners with diverse skills and knowledge to navigate and innovate in different contexts.

Furthermore, integrating multiple disciplines such as business, economics, law, psychology, technology, and sociology creates a holistic learning environment in EE. Globalisation influences the development of EE by emphasising various cultural perspectives that expand entrepreneurial competencies.

Regarding the schools of thought, the definitions highlight several key characteristics [9]:

- It belongs to a community of researchers and scholars;
- The members share the same interests, opinions, ideas, and beliefs;
- It is coherent and distinct from existing schools of thought;
- It functions as a generator of knowledge.

Kuratko [8] stated that a school-of-thought approach divides entrepreneurship into specific activities, either from a macro or micro viewpoint, both addressing the conceptual nature of entrepreneurship.

This section will focus on the following directions that are present in the literature: economic, psychological, sociological, cultural, resource-based, opportunity-based, strategic, behavioural, and cognitive, as displayed in **Figure 1**.

3.1 Economic entrepreneurship

This school emphasises the role of economic plans that an entrepreneur should be aware of when running a company. The market phenomenon and dynamics, profit and costs, along with the creative process catalysed by opportunity costs of developing products that could satisfy a market need, are the main focus of this school [10]. The central element is economic efficiency, with profitability being the main goal



Figure 1.
Development directions of EE.

of entrepreneurial activity; Factors such as market demand, access to capital, and economic incentives driving entrepreneurial activities. In this view, the entrepreneur is the person who coordinates various production factors [11].

3.2 Psychological entrepreneurship

This direction focuses on the individual traits and psychological characteristics of entrepreneurs, such as specific needs, desires, attitudes, beliefs, and values that drive them [12]. Risk-taking propensity, need for achievement, self-confidence, and innovativeness are personal characteristics highlighted under this perspective. The premise is that if students are aware of improving a set of personal traits, they can more easily immerse themselves in entrepreneurial ventures. Fellenhofer [13] found that EE should consider students' motivation, intentions, self-efficacy, and personal qualities when setting up an entrepreneurial curriculum. Honesty, duty, responsibility, and ethical behaviour will drive students into entrepreneurial ventures and help them persist longer. Moreover, it is important to take into consideration the emotions and perceptions that come from educational experiences [14].

Furthermore, more studies support the perception of learners regarding their increased creativity after EE and their ability to transfer it to a team, which could represent a significant benefit for those who attend entrepreneurial programmes [15].

3.3 Social entrepreneurship

This cluster examines the social context and networks surrounding entrepreneurs, including family background, social capital, and norms. Surveys indicate that EE cannot be efficient without the interconnection between individuals and society [16].

The dynamics of ecosystems play an important role in EE today, necessitating links to business community initiatives [17]. Internationalisation involves the exchange of students who immerse themselves in various environments, resulting in added value as students and the community learn together how to increase social well-being [18].

3.4 Cultural entrepreneurship

The cultural direction studies entrepreneurship through cultural and anthropological lenses, examining how cultural values and practices influence entrepreneurial behaviour. Researchers suggest adapting the curricula for EE based on cultural values, as learning efficiency is directly linked to them [19]. Moreover, globalisation of education relocates students who are eager to gain experience in different cultures, a factor that makes them more prepared for an international entrepreneurial journey.

3.5 Opportunity-recognising entrepreneurship

This school highlights the identification and exploitation of opportunities as the central activity of entrepreneurship. This classic approach to EE, which considers the management and role of the entrepreneur, analyses the opportunity facet of venture development [20].

3.6 Resource-based entrepreneurship

This school argues that the unique resources and capabilities of entrepreneurs are key to their success. They should adjust their entrepreneurial goals in terms of the

resources available to them in a specific context and market [21]. In this paradigm, the firm's sustained competitive advantage is based on existing resources.

3.7 Strategic entrepreneurship

This part of macro schools focuses on the strategic decision-making processes and competitive positioning of entrepreneurs. Techniques for analysing industries and competitors, along with strategic planning methods dealing with goal setting, vision strategies, tactics, and plans, are crucial for this school. In this view, EE should provide insights from the planning process in the development of successful ventures [20].

3.8 Behavioural entrepreneurship

This school examines the behaviours and actions of entrepreneurs, including how they manage ventures and adapt to changes. The premise of this school is that innovation lies at the heart of entrepreneurial behaviour [12]. Shnimar and Hsu underline the fact that EE increases the self-efficacy of learners and also entrepreneurial intentions [15]. From this perspective, the implementation part of the business is more important than the business idea because the operational part is crucial for adapting to the markets. The point that entrepreneurs should be agile in executing plans that tackle opportunities arising from the market is prominent under this school.

3.9 Cognitive entrepreneurship

This school investigates the cognitive processes and mental models that influence entrepreneurial decision-making. The business venture creation process through this school enables students to take risks, fail, and dare to step out of their comfort zones. Mitchell et al. [22] suggest that this approach reexamines "the people side of entrepreneurship." Moberg's study underlines that EE increases the propensity toward the entrepreneurial process, even though the commitment to learning in general may decrease [23]. Building critical thinking through EE to create innovative products for the market is another main direction of this school [24, 25].

The development of entrepreneurship as a recognised discipline has led to the creation and growth of various schools of thought. These schools have not only emerged from the academic study of entrepreneurship but have also played a crucial role in continually enriching and expanding the field. Overlapping and interacting in many regards, these schools create a synergistic process that improves EE. As a result, the entrepreneurial domain benefits from a diverse array of perspectives and insights, further advancing the understanding and practice of entrepreneurship. Each school offers unique insights into the multifaceted nature of entrepreneurship, contributing to a more comprehensive understanding of what drives entrepreneurial success. This diverse enrichment of the field through unique perspectives and insights ultimately leads to the development of effective techniques in EE.

4. Effective techniques in EE

EE employs diverse methodologies to equip students with essential skills and knowledge. This chapter explores effective techniques such as experiential learning,

mentorship programmes, and business plan competitions. These approaches foster creativity, innovation, and practical skills, preparing students for global market challenges. By understanding the advantages and limitations of these methods, educators can refine their strategies to ensure EE remains impactful and relevant.

4.1 Experiential learning

Experiential methods involve learning through direct experience, such as simulations in incubators and accelerators, case studies, internships, and hands-on projects. Besides gaining real-world skills and practical knowledge, the main benefit is to provide participants with a higher level of engagement and increased retention of knowledge [26, 27].

In incubators and accelerators, co-working spaces, impact hubs, or corporate bases for scaling and innovation, learners can experience the challenges of launching and growing a business while having access to resources such as office space, networking, and funding opportunities.

Events with limited time, such as *hackathons* and *innovation challenges*, offer students the opportunity to develop specific solutions for existing problems in teams. This fosters creativity and problem-solving skills. At the same time, working in teams under pressure enhances participants' collaboration, flexibility, communication, and resilience.

Entrepreneurship boot camps are intensive short-term programmes that provide training for launching a business. Students focus on specific goals, supported by mentors and networking opportunities. In this setup, they will develop the most important entrepreneurial skills.

Game simulations are methods frequently used for venture capital adjustment or stock exchange dynamics where learners make strategic decisions in a risk-free environment. This helps students assess the impact of their decisions in a limited-resource environment.

Service-learning programs offer learners the opportunity to plan, organise, coordinate, and implement projects that address community needs while learning entrepreneurial principles. This method promotes social responsibility and provides practical experience in project management and problem-solving.

Internships in entrepreneurial ventures provide practical exposure to the daily operations of a startup. Students may benefit from networking and guidance from experienced entrepreneurs.

Start-up/industry visits offer insights into different business models and entrepreneurial ecosystems.

In *live case studies*, participants work on real-time business challenges faced by local startups, providing solutions and strategies. An advantage of this is the higher level of engagement with real problems, enhancing relevance.

Pitch contests are organised for students to present business ideas in front of a jury that includes investors, industry experts, and professionals. Apart from valuable feedback from the panel, this exercise enhances presentation and persuasion skills.

Some disadvantages of experiential learning methods are related to the cost of the process in terms of time and financial resources. The quality of the educational process can vary significantly depending on the appropriateness of the simulations for the learners, the projects, and the educators [28]. For incubators, the high competition for admission, along with neglecting formal education due to the

focus mainly on business processes, are considered downsides. At hackathons, for example, given the limited timeframe, the learning process is very general (not as in-depth as it should be), and in many cases, participants do not have enough time to research all business levels. Bootcamps are also rather general in terms of knowledge coverage and, being concentrated, can be overwhelming for some students. Furthermore, some game simulation methods do not provide all the existing elements of the complex real-life environment, and the design of the simulation is crucial. It has to be realistic and should be adapted to the local environment. Service-learning projects, on the other hand, may require a high level of coordination and collaboration with community partners, while the impact can depend on the role of each student during the implementation (e.g., those involved in fundraising will acquire limited learning outcomes). Internships might not always be successful because the outputs can vary widely depending on the host organisation's commitment and the students' ability to balance their business-related tasks with educational responsibilities. For start-up visits, the limited timeframe could restrict interactions, thus hindering learning. For live cases, the difficulty lies in coordinating educators with business owners and students. Pitch contests, as an EE method, might overshadow the importance of developing a solid business plan by focusing too much on the pitch itself.

4.2 Mentorship programmes

Mentorship programmes support EE through networking with experienced entrepreneurs, who provide mentoring, training, and coaching.

The advantages of this method include offering personalised advice and feedback for the specific situations that learners encounter, and enhancing their networking within the entrepreneurial ecosystem [29]. Learners can connect with experts from the community and have the opportunity to test their entrepreneurial ideas in real-world conditions [30, 31]. However, there are some drawbacks to this process. The limited availability of the mentor's time and the variable quality of mentorship, due to differences in mentors' motivations, expertise, and experience, can be challenging [32]. Another disadvantage could be the time-consuming matching process and the fact that the number of available mentors is often insufficient to ensure that all students have access to high-quality experts [33].

4.3 Business plan competitions

For business plan competitions, students must develop and present business plans to a panel of experts. These competitions motivate students to seek opportunities in the market, find solutions to alleviate pain points, set goals, and create strategies, tactics, and plans for implementing and refining their business ideas [34, 35]. Obtaining constructive feedback from industry experts and enhancing their learning experience is a significant benefit [36]. However, there is also a risk of encouraging a short-term focus on winning rather than long-term business development.

Understanding the advantages and disadvantages of these methods for teaching entrepreneurship will help educators refine their strategies, ensuring that EE remains relevant and impactful. This comprehensive exploration of effective techniques underscores the importance of equipping future entrepreneurs with the crucial competencies needed to succeed in an ever-evolving business landscape.

5. Analysis of crucial competencies for future entrepreneurs

In the current economic context, entrepreneurs are the driving force behind innovation and societal progress. They create jobs, stimulate economic growth, and bring about positive societal changes by introducing new ideas, technologies, and innovative business models. Their initiatives significantly contribute to the advancement of science, technology, and the broader economy. A recent study by [37] highlighted the fact that entrepreneurial skills had surpassed digital skills in importance within the labour market. This shift underscores the need for entrepreneurs to integrate existing competencies and explore and develop new ones, as the evolving economy demands [38].

The literature on general competencies, and specifically on entrepreneurial competencies, aligns with the definition of entrepreneurial competencies, which are the knowledge, abilities, and attitudes that impact the willingness and capacity to generate new value [39–41]. Competencies are generally understood as skills and abilities gained through professional experience, education, or personal development, whereas future competencies refer to skills that will become particularly valuable and desirable in the evolving labour market [42].

After analysing the literature, we suggest in **Table 1** the essential competencies for future entrepreneurs.

Competency group	Individual competency	Description
Strategic and analytical skills	<i>Opportunity recognition and assessment</i>	The ability to identify altered conditions or overlooked opportunities in the environment that could generate profit or benefit a venture, coupled with the skill to evaluate the details and structure of these opportunities to judge their potential value accurately [35]. This includes skills for developing products, services, and concepts, as well as identifying and seizing business opportunities and other types of opportunities [43].
	<i>Analytical thinking</i>	The capability to approach problems with a logical, systematic, and impartial mindset, allows entrepreneurs to analyse data thoroughly, grasp the context of their environment, anticipate trends, and make well-informed decisions [42].
	<i>Decision-making</i>	The ability to evaluate options, assess risks, and make strategic choices in uncertain situations, enabling future entrepreneurs to navigate complex environments, seize opportunities, and drive innovation, which is fundamental to entrepreneurial success [44]
	<i>Risk assessment and management</i>	The ability that involves taking actions to reduce the probability or impact of risks [35], while adopting a fearless, aggressive stance in insecure decision-making situations to maximise opportunities [42, 45, 46]
	<i>Strategic planning</i>	The capacity to make current entrepreneurial (risk-taking) decisions methodically and with a deep understanding of their potential future consequences. It entails planning the actions required to implement these decisions and using systematic feedback to compare the outcomes to expectations. This continuous process ensures that decisions are informed, efforts are coordinated, and outcomes are evaluated to align with strategic objectives [47]
	<i>Financial management</i>	The ability to define financial goals, develop and implement plans, and make decisions on assets, loans, insurance, and investments, involving sales projections, income predictions, resource allocation, and evaluation of financial outcomes to achieve strategic objectives [48], minimise risks and maximise profits [42]

Competency group	Individual competency	Description
Interpersonal and leadership skills	<i>Leadership</i>	The ability to set an effective vision, inspire and guide individuals toward achieving common goals, elevate their vision to higher aspirations, enhance their performance standards, and facilitate personal growth [49], is essential for navigating the challenges of entrepreneurship.
	<i>Networking</i>	Social abilities that enable individuals to develop a network of contacts [50] build, nurture, and sustain relationships with others who can support their career or work advancement [35] gather insights, or promote their business [42].
	<i>Understanding customer relationships</i>	The ability to understand relationships with customers refers to establishing and maintaining positive interactions, listening to and understanding customer expectations and needs, effectively gathering feedback, adapting products and services to customer preferences, increasing loyalty, building long-term relationships, and promptly addressing potential service issues, which are essential for customer satisfaction and retention [42].
	<i>Creative thinking and problem-solving</i>	The skill to think unconventionally, generate innovative ideas, identify market gaps, recognise potential in different areas [42], and connect unrelated objects or variables to create useful outcomes [35].
	<i>Digital literacy and competencies</i>	The capability to efficiently utilise digital technologies, tools, and platforms to find, evaluate, create, and communicate information, involving cognitive, technical, and socio-emotional dimensions [50], as well as a broad spectrum of digital skills, soft and global competencies, and proactive skills that foster accountability and active participation [42].
	<i>Adaptability and flexibility</i>	The capacity to adjust, evolve, and prosper amid changing conditions [51] balancing a focus on achieving goals and guiding the organisation's strategic direction while enhancing alignment with external developments [35].
Personal attributes	<i>Self-efficacy</i>	The ability to sustain self-confidence in one's capability to complete a specific task or achieve a certain level of performance [35].
	<i>Perseverance</i>	The capacity to triumph over challenging conditions [52, 53].
	<i>Resilience</i>	The capacity to handle stress and disruptions, maintain well-being, recover, or even thrive when faced with adversity [35].
Ethical and sustainable practices	<i>Ethical and sustainable thinking</i>	The ability to incorporate ethical principles and sustainability considerations into decision-making processes, ensuring that business practices contribute positively to society and the environment while achieving economic goals, is essential for creating value that extends beyond financial profit and contributes to ecological and social well-being [54].

Table 1.
Essential entrepreneurial competencies for the future entrepreneur.

Unlike general business professionals who operate within established structures and roles, entrepreneurs face complex, multifaceted problems in resolving uncertainty and exploiting opportunities, requiring them to create new organisations, establish routines, structure resources, and make numerous critical decisions. This is why an entrepreneur needs a variety of skills to navigate this ever-changing environment. To address these needs, it is crucial to examine the key areas of focus in EE that help cultivate these diverse and essential competencies.

6. Taxonomy of needed topics in EE and trends

In today's rapidly evolving global economy, EE has become crucial due to the rise of digital technology and the growing need for innovation, which increases the demand for individuals with entrepreneurial skills and mindsets [55]. This form of education aims to transform students' views on risk-taking and innovative business practices [56]. It has evolved from merely teaching how to start a new business to also encompassing the identification of business opportunities and the initiation of digital ventures [57].

Beyond enhancing entrepreneurial skills [58], EE fosters deep learning, engagement, joy, motivation, confidence, and a sense of relevance in learners, while contributing to job creation, economic success, renewal, and innovation on individual, organisational, and societal levels [59]. This broad impact underscores the significance of integrating EE into the broader educational framework to nurture a more innovative and vibrant economy.

According to the European Commission [60], EE is distinct from standard business and economic studies, aiming to nurture innovation, creativity, and self-employment, in the sense of:

- Fostering essential personal qualities and skills for an entrepreneurial mindset, such as initiative, risk-taking, independence, self-assurance, leadership, and collaboration.
- Educating students about the possibilities of entrepreneurship and self-employment as career paths.
- Engaging students in hands-on enterprise projects and practical activities.
- Teaching specific business skills and knowledge required to start and manage a successful business.

To achieve these goals, it is crucial to align educational topics with the competencies needed for entrepreneurial success as shown in **Table 1**. **Table 2**, connects these entrepreneurial competencies to main topics in university curricula, ensuring a comprehensive approach to EE:

Analysing some of the most relevant topics supporting EE and developing the necessary competencies to establish an entrepreneurial mindset, we must acknowledge

Competency group	Relevant university curriculum topics
<i>Strategic and analytical skills</i>	Market research, product development, critical thinking, strategic management, risk management, financial management, project management, business strategy
<i>Interpersonal and leadership skills</i>	Leadership, professional development, business communication, customer relationship management, marketing, design thinking, change management
<i>Personal attributes</i>	Personal development, stress management, time management, communication
<i>Ethical and sustainable practices</i>	Business ethics, sustainable development, corporate social responsibility

Table 2.
Relevant university curriculum topics.

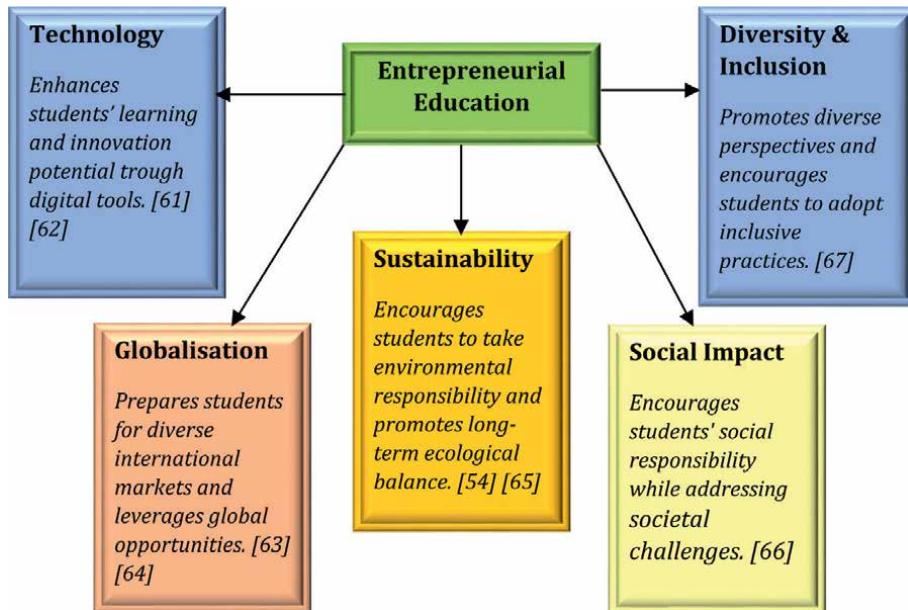


Figure 2.
Influence of external factors on EE.

also the various influences impacting EE, such as globalisation, technological evolution, social impact, sustainability, and inclusion. To better illustrate how these trends influence EE, we present **Figure 2**.

By understanding these influences, we can better adapt educational strategies to foster a more dynamic and effective entrepreneurial learning environment.

7. Conclusions and limitations

To propel innovation, economic expansion, and societal advancement, entrepreneurs must possess a broad range of abilities and qualities due to the dynamic nature of the economy. Essential competencies include opportunity recognition, analytical thinking, decision-making, risk management, financial management, strategic planning, leadership, networking, and digital literacy. Equally significant are character traits like self-efficacy, tenacity, resilience, and a dedication to moral and sustainable behaviour.

EE must evolve to meet these needs by focusing on developing an entrepreneurial mindset and practical skills through hands-on projects, while fostering creativity and innovation. By integrating these competencies into educational frameworks, institutions can better prepare students to navigate the challenges of the global market, technological advancements, sustainability, social impact, and inclusivity. Providing future entrepreneurs with the necessary skills through quality education is crucial.

EE is a multidimensional and complex concept that impacts not only the acquisition of knowledge and skills among entrepreneurship students but also supports the development of important psychological traits and proactive attitudes. The literature demonstrates a significant link between EE and EI, although further research is needed to fully understand the complexity of this relationship.

In conducting our research, several limitations should be acknowledged. Primarily, our review is not exhaustive, being focused particularly on references published mainly after the year 2000, which may have offered the latest insight. Furthermore, our study concentrated predominantly on the domain of adults/students' entrepreneurship education, thereby excluding a comprehensive analysis of entrepreneurship education targeted at other demographics, such as school pupils or senior individuals. These limitations may affect the extrapolation of our findings, and future research should aim to address these gaps to provide a more holistic understanding of entrepreneurship education across various age groups and time periods.

This chapter aims to offer an overview of the concept with emphasis on the relation between EE and entrepreneurship development, entrepreneurial teaching techniques, entrepreneurial competencies, topics to be approached, and discussions regarding important directions of entrepreneurship development. Several other aspects were not discussed, such as comparisons and analyses of key competencies and teaching methods across continents and their impact in various geographical areas, or the impact of the specific didactic principles of the various disciplines associated with EE on entrepreneurship knowledge and ability transfer to students. While these aspects are beyond the scope of this chapter, their inclusion would add value to the analysis. Future research will address these areas.

By focusing on both the psychological traits and practical skills necessary for entrepreneurship, EE programmes can more effectively prepare students for the challenges of starting and sustaining their ventures. This holistic approach ensures that students not only gain the technical knowledge required but also develop the personal attributes and emotional resilience needed for long-term success in the entrepreneurial world.

Conflict of interest

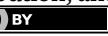
The authors declare no conflict of interest.

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Chapter 12

Technological Advance and the Future of Business Education

Jae Hyeung Kang

Abstract

The technological advance gave us many benefits. In the meantime, many of the tasks performed by humans are rapidly replaced by the machines. This change provides several cost benefits to the companies, but we cannot ignore the adverse effects. We need to know which aspects of our jobs will be replaced by automation and which aspects will still require human knowledge and skills. In addition, COVID pandemic has negatively affected the university education in terms of limited in-person classes, operational challenges, and enrollment issues. These challenges urge the business schools to revisit their existing education models and change their curriculums and campus programs to survive. This book chapter aims to discuss how business education should be changed in accordance with the external environmental challenges driven by the technological advance and COVID pandemic. Business schools should provide new educational curriculums and new degrees to meet the fast-changing market demands and technological advances. However, some criticize the value of business education as they observe emerging institutions and educational platforms that teach people to acquire new skills faster and more efficiently than the current educational programs provided by universities. Given these environmental changes, business schools should contemplate what should be changed and what should be kept to maintain the core values of business education.

Keywords: technological advance, COVID pandemic, business education, environmental changes, automation, humanity

1. Introduction

Technological advances have given us many benefits. In the meantime, many of the tasks performed by humans are rapidly replaced by machines. This change provides several cost benefits to the companies, but we cannot ignore the adverse effects. We need to know which aspects of our jobs will be replaced by automation and which aspects will still require human knowledge and skills. In addition, COVID pandemic has negatively affected the university education in terms of limited in-person classes, operational challenges, mental health challenges, higher rates of misbehavior, and enrollment issues [1]. These challenges urge the business schools to revisit their existing education models and change their curriculums and campus programs to survive. This book chapter aims to discuss how business education should be changed

in accordance with the external environmental challenges driven by the technological advance and COVID pandemic.

Business schools should provide new educational curriculums and new degrees to meet the fast-changing market demands and technological advances. However, some criticize the value of business education as they observe emerging institutions and educational platforms that teach people to acquire new skills faster and more efficiently than the current educational programs provided by universities. Given these environmental changes, business schools should contemplate what should be changed and what should be kept maintaining the core values of business education.

I believe that business schools should consider two aspects to meet the fast-changing market expectations. The first one is the technological aspect. As new technologies (e.g., Artificial Intelligence, Big Data, Machine learning, etc.) are introduced in the market, business schools try to acquire this new knowledge fast and educate students accordingly. These attempts satisfy the universities' genuine roles as knowledge providers. However, if there are alternative institutions that provide similar knowledge more efficiently and cost-effective manners, the identity of business schools can be threatened. The second one is the philosophical aspect. The genuine role of business school is to generate fundamental business knowledge for students and employers and develop the intellectual powers of business leaders [2]. Regardless of new technological advances and environmental changes, I believe that business schools should continue to settle down the foundational and philosophical pillars to society.

Until now, private companies have been leading business trends, and business schools have provided the theoretical basis for this. Meanwhile, as new cutting-edge technologies and management techniques arise and the market conditions change rapidly, the need for new business education is constantly being raised. I think the important thing here is to develop a balance between the technical and philosophical viewpoints.

2. How far can technology replace human abilities?

The introduction of ChatGPT brought great changes to both students and professors. Students were able to write essay assignments much more easily and quickly, and professors were able to organize materials and extract key points much more easily when preparing lecture content. The important question here is whether Artificial Intelligence (AI) is helping anyone and how. We need to properly understand whether our core competencies will be further improved with the help of AI, or whether AI will replace us. When a new technology is introduced to the world, people make positive or negative predictions based on their own insights. Regardless of what the predictions are, AI will have a profound impact on us.

Business schools cannot escape the influence of AI. This is deeply related to the purpose of education. Some business researchers criticize that people do not properly understand the meaning of education. It is said to be derived from the Latin word “educo,” which means “to bring out something latent within us” [3]. From that perspective, education is effective when the processes of learning something from the outside and discovering something hidden inside of me occur simultaneously.

After learning the etymology of education, I began to think again about the existing education methods used in business schools. Until now, I had thought that education was about knowing as much information about a specific field as possible and conveying the knowledge the professor knows to students in an easy-to-understand

manner to help them do well in exams. However, from the perspective of education helping others bring out their potential, I learned that the fact that business professors know a lot may have nothing to do with the other person's potential.

According to the OECD employment outlook published in 2019 [4], there are increases in low and high skilled jobs. However, it should be noted that there is a dramatic decrease in middle-skilled jobs. For example, general office clerks, service workers, sales representatives, and factory workers could be largely replaced by automation technology. These changes provoke the business educators to rethink the existing education model and rebuild the future education model to survive. Before the COVID pandemic, existing values were around productivity, growth, innovation, and leadership. The pandemic let us rethink the growth paradigm, the value of middle skilled jobs, and the identity issue of human beings. I believe that business educators will have to create something new and useful for the future education system. It is time to redefine the existing values and make an entrepreneurial action.

Three conditions that will not be easily replaced by machines are (a) creativity (it is still very difficult to algorithmize a machine to create something new on its own), (b) social intelligence (what people want from me when I hang out with them, what I want them to do, or the ability to recognize cognition through intuitive understanding), and (c) task complexity (the human ability to interact in an unstructured environment with very complex objects intermingled). These three areas will also be gradually replaced by machines due to the development of AI technology. To that extent, the contribution of humans will gradually decrease, and jobs based on unique abilities, skills, and knowledge that only humans can provide will largely disappear. Nevertheless, predicting what roles only humans can play and providing educational services that can advance the field will be the key to enabling the survival of business schools. Therefore, it is very important for future education to find an area that only humans can perform in and to create meaningful curriculums accordingly.

Business is an activity that makes money in return for helping someone. Here, help means tangible or intangible value, and compensation means goods with values agreed upon by society. When AI says it helps us, we need to think about whether we really pay for it. Additionally, when we use AI to create something, it is very important for people to decide whether to pay humans or AI for it. If monetary compensation does not go to humans, but to AI, human value is replaced by AI.

So, how should business schools change so that they are not replaced by AI, but rather use AI to provide more value? Business school professors should teach students how to use AI properly. If AI makes human life easier, universities can teach how to do it. Students who learn that method can use AI to help create products and services that are helpful to society after graduation. Since human memory is limited, if AI can be used to access huge amounts of data and extract the desired information, this can also be a way to maximize human potential. Thus, AI must be developed in a way that enhances human potential. The reason humans use AI technology stems from their natural desire to overcome their own limitations.

3. The crisis of business schools driven by COVID pandemic

COVID pandemic changed many things in our world, and the education system is no exception. Many universities are facing big financial and operational challenges due to the pandemic. Many of them are forced to reduce the funds and shut down the operations related to in-person activities like sports events and social gatherings.

Unfortunately, some universities had to close again because of the surging infections on the campus. On the other hand, some other universities like Stanford and Columbia set new MBA application record despite offering primarily online [5]. These changes represent a potential risk of polarization in universities and lead us to rethink the existing models in university education system.

How about the future of business education? If you browse YouTube, you can easily find many great lectures that may satisfy your intellectual needs. Therefore, many people predict that the business education system will be changed dramatically. And some radical ideas predict that business education will be doomed to extinction due to the insuperable challenges. Currently, business schools are engaged in teaching, research, and service. These three aspects are facing big changes due to COVID-19, and some aspects will be more affected than the others.

To successfully address the challenges, I think that business schools need to identify their genuine roles for the business world and should become more like the original form of university. Originally, the university was an organization to create knowledge. This means that conducting research may become a more crucial element for the survival of business schools. However, what will happen if people do not read the research outcomes? This may indicate that researchers in business schools are producing garbage. Therefore, I believe that business researchers should contemplate harder how their research outcomes will be beneficial to our real business world directly or indirectly. In addition, business schools should contribute to job creation. If there is no job available, there is no need to educate humans.

It is very difficult to predict what will happen to business schools right now. But I think the unchanged role of university is to educate business students to pursue their majors so that they can provide their respective values to the business world. If business schools can take genuine roles to the business world, we are sure that they will survive in the future. Even before the COVID pandemic, we were experiencing the transformation from offline to online. COVID pandemic just expedited the change, and this change made our deserved life not natural anymore.

Along with this change, the structure of society will be evolved in totally different directions. We will experience increased collaborations beyond the geographic restrictions due to the advance of communication technology. For example, employees in Michigan do not need to physically present to work in Michigan, and they can even work for different companies in different countries such as Korea, Germany, and India. This indicates that humans are overcoming geographic limitations when it comes to productivity. In addition, those who gain good reputations will have more opportunities regardless of geographic limitation. That is ironic because we are physically confined, but our contribution possibility is going beyond geographic restrictions. This change asks us a big question: how to raise our children and what kind of business education is to be required.

4. Critical views on business education

I believe that the main functions of business schools are knowledge creation and job creation. From a knowledge creation perspective, as various management theories have been introduced to our society and industry, many companies that have applied them have achieved remarkable growth. In addition, American business schools have contributed to the creation of quality jobs through the revival of MBA programs. These two functions have been the main driving force behind the development of

business schools so far. However, due to the rapid development of technology and the huge changes in the industry due to the COVID-19 shock, it is time to reexamine the education model of business schools and seek a new direction.

First, I think it would be helpful to look at critical perspectives on knowledge creation and job creation in business schools. Criticism of knowledge creation raises questions about the utility value of existing management research. This is a criticism of whether management theory really provides practical help to existing company management and industry. To be more specific, research papers written by management scholars are mainly read by professors and doctoral students. However, in reality, the content taught to bachelor's and MBA students in business schools is not research papers, but practical papers such as Case Study Articles or Harvard Business Review. This also indicates the gap between research and practice. Many management scholars have already pointed out this problem, but no clear solution has yet been found.

Second, there is criticism of job creation. Recently, online education programs, including YouTube, and private academies that teach practical skills have continued to appear as more effective alternatives to business education. If business schools do not provide practical help to students in acquiring the knowledge and skills needed for future jobs, students may gradually leave business schools. Additionally, students may wish to study more practical majors such as engineering, medicine, pharmacy, biotechnology, or industrial design. This phenomenon already seems to be spreading rapidly. However, no matter what field you choose to pursue your career in, understanding business and managing people seems to be an important and necessary virtue for everyone.

Of course, there are clear institutional advantages that business schools have. For example, the social currency value of a college diploma will not disappear easily. The meaning of a college diploma cannot be ignored in social life, and this may be because it provides an opportunity to maintain a sense of belonging to a reference group and access a more diverse professional network.

In business management research, the distinction between exploration and exploitation has been studied for a long time. According to research by various scholars, the relationship between exploration and exploitation can be divided into opposite, orthogonal, complementary, and dialectic relationships, and many empirical studies tend to define these relationships as antagonistic or orthogonal. The problem is that in the AI era, companies tend to pursue a complementary dialectical relationship through repetition of exploration and exploitation, but business education has not paid the full attention to the link between exploration and exploitation. While taking the attitude of assuming that it is an area to be replaced, it is missing the part where exploration and exploitation are combined.

In fact, it is not clear which part of the exploration area can be free from the substitution of machines, and in fact, there is no reason why machines cannot handle any creative area that only humans can perform. How creative humans can be in a day, and problem-solving is nothing miraculously new. Even the neural structures that humans take decades to solve are visualized in a few hours by deep learning. It is necessary to reconsider the value of exploration, which is overestimated by business schools, and the value of exploitation, which is underestimated by business schools as well. It raises research questions and suggests how, as an alternative, business education can strengthen the link between the two values.

It is a complementary concept, not an opposite concept. Too much exploration is dangerous because it can be practical for vocational education. Synergy can be created only when foundational knowledge is based on combining both exploration and

exploitation. It may be necessary to apply a method that harmonizes exploitation and exploration within the classroom. Students should acquire enough knowledge related to their major and give them an opportunity to apply. For example, a student who has acquired sufficient basic knowledge of accounting will be able to learn the knowledge necessary to develop accounting automation software. Here, I believe that only after students acquire fundamental knowledge related to business education, they will be able to explore new business opportunities using this knowledge.

5. Challenges and opportunities facing business schools

We are facing big challenges in the business education system. According to the theory of natural selection, species that cannot adapt well in the changing environments and are not flexible to change will not survive. It could be true to the business education market. During the pandemic, many of the business schools experienced financial and operational difficulties. Despite this hardship, few business schools surprisingly demonstrate outstanding performance and become role models to the other institutions.

The business school's revenue model can be broadly divided into government funding from research results, tuition from students, and donations from private sectors and individual donors. In the case of research schools, the proportion of funding based on research performance is high, and the proportion of tuition fees will increase as you go to a teaching school. In the case of business schools, the decrease in international students due to COVID-19 (short-term factors), the departure of existing students (short-term factors), and a decrease in the school-age population (long-term factors) can lead to a decrease in tuition.

For the survival of the business school, it is necessary to understand the sustainability of the current business model and to determine which areas to focus on in the future. I will mention a few areas that business schools can cover in the future.

5.1 Autonomous driving technology

How far will it be commercialized? Will fully autonomous driving be possible? Who is responsible in case of an accident? If the driver leaves the vehicle to fully automatic driving, an accident caused by a system error can cause enormous problems for the driver and the victims of the accident. There is a lot of debate about whether fully autonomous vehicles will be commercialized. It is not known whether the machine will perfectly cope with various unpredictable situations that occur while driving with sensor and camera technology. In addition, institutional and legal devices must be prepared ahead of time to deal with the responsibility for accidents caused by aging and system operation errors. In the end, it may take much more time than we thought, and there is a possibility that it may be commercialized in a form different from what we expected.

5.2 AI-powered customer service

Many companies are moving from customer service to AI-powered automation to cut costs. However, from the customer's point of view, it is difficult to get the answer they want right away, so they tend to connect directly with an agent. The company spends a lot of money to build an AI-based counseling service, but if it feels uncomfortable from the customer's point of view, it seems urgent to fix it. Automating

customer service could also be impossible to implement because there are too many variables for AI to fully handle. As a result, consumers still prefer to speak directly to an agent rather than using AI. There is still debate about how AI can identify applicants' competencies in conducting job interviews and hire the people the company wants. Changes in the market environment according to these technological changes may bring new educational opportunities. For example, there could be a company that specializes in instilling ethics into AI. Technology is replacing humans, but due to the uniqueness of humans, the application of technology may cause inconvenience or sometimes create dangerous situations. In particular, the problem of errors and AI-related ethical issues that inevitably follow in the application of AI will be an important task that must be continuously addressed and corrected in the future. In this regard, new academic and educational demands can be expected.

5.3 Application of deep learning technology

The “iruda” (Korean AI software), which has been recently discontinued due to unethical use by users, is a good example of how deep learning can cause side effects [6]. The moment people recognize that the other person is a machine, not a human, they can ignore morality and act recklessly. This can also be considered in connection with the problem of malicious comments online due to anonymity. No matter how advanced technology is, the person who uses the technology will take the final responsibility. Business education will be able to create value by identifying areas that still require human ability even after being replaced by machines and providing new education necessary for this. If very simple tasks that can be easily performed by humans are replaced by machines, it can cause inconvenience. For example, serving and grilling meat in a restaurant, for example, can require a lot of logic for a machine to perform. These very simple tasks for humans to perform are highly likely to remain as low-wage simple labor rather than being replaced by machines.

ChatGPT4.0 was recently released, and when I used it, it seemed to show tremendous performance compared to the existing version. I lost track of time as I asked various questions for a while. However, when I asked a question about myself to ChatGPT4.0, it was mostly correct, but there were some errors in the information. Although it is difficult to properly understand the algorithm, it seems that when a question is asked, the information floating around online is quickly scanned and recombined to arrive at a result. I think there is a huge pitfall here. If false information is repeatedly posted on the Internet, it is doubtful whether AI will have the ability to correct these errors. Abstract, conceptual, and ethical value judgments that come naturally to humans may not be natural to AI. In addition, certain values that are taken for granted in one country may be considered wrong in another country, and how AI will judge this may be controversial. I think AI companies are probably already aware of this problem, but I wonder if this can really be solved technologically. Thus, I think the role of business education is important in understanding these problems and suggesting solutions in the future.

6. Suggestions for the future business schools

Although business educators are still trying to understand the magnitude of change to the education system, I anticipate the following changes in the format of future education.

Lifetime education: In an era where professionalism is becoming more important, diverse and professional lifelong education programs that can increase professionalism are needed. Since the demand for highly skilled jobs will dramatically increase in the future, people will need to educate themselves to gain the new knowledge within their specific expertise. From my personal point of view, the experts in any given field tend to know better what to learn for strengthening their knowledge than the normal people. Therefore, educational institutions should be able to provide lifelong learning opportunities within their curriculum.

Curricular Reform: There is a need for a business education program that can develop skills that can help the changing business environment and competency necessary for the future environment. Accordingly, restructuring of the business curriculum is essential. In business administration, it is necessary to simplify the basic courses and provide a variety of elective courses that can be applied immediately after experiencing business in practice. For example, there is a need for more project-based courses that provide an environment where students can proactively identify problems and present solutions by using practical business activities that combine technology and management as educational materials.

Digital Transformation: As non-face-to-face online classes develop due to the COVID pandemic, the importance of education through online platforms is expected to continue to be emphasized even in the post-COVID era. As a result, it is necessary to continuously develop new educational techniques. For example, it is possible to provide an educational environment that transcends geographical limits. An educational environment in which students from other countries can collaborate online may become possible. In addition, it would be possible to create an environment where we can learn from famous foreign scholars and innovative entrepreneurs by inviting them online as guest speakers.

Individualized learning: Since the nature of future jobs can be hard to describe, traditional education that provided formalized knowledge to a mass of students may not work well for the future generation. To provide the unique and meaningful values to the future employers, people need to acquire the relevant knowledge and skills to meet the specific demands. Given this, individualized learning should be offered from educational institutions. Fortunately, remote learning with various tools, AI techniques, and machine learning may provide a possibility for this change.

Apprenticeship in the digital world: Because we can easily get connected to other people around the world *via* social media (e.g., LinkedIn, Facebook, and Instagram etc.), we can directly reach out to them and ask for possible collaborations without the middleman who introduces one and another. If this could be challenging for an individual standpoint, educational institutions should be able to actively provide mentorship and apprenticeship services to the students so that they can develop the valuable network and learn the key knowledge and skills from the mentors. Business schools that have the feasible pools of mentors in the alumni network will be more promising in the future.

Joint Programs with other schools: As the business environment changes, it is important to understand and apply various technologies and management capabilities to manage a company. Therefore, not only the curriculum provided within the business schools but also curriculum collaboration with other universities such as engineering, medical, public health, and humanities colleges may become more important. Furthermore, by activating partnership-linked courses with other universities, I hope to provide a comprehensive understanding of the global environment and practical educational opportunities to study and grow with students from other cultures.

Executive education: Recently, interest in executive education has been growing, centering on business schools. To participate in management and exert influence in a company, one must be promoted to an executive level above middle manager, and business education programs for them are on the rise. The reason for this is that in the rapidly changing business environment, the demand for executives to review whether the management techniques they are familiar with are suitable for the new business environment and learn new management techniques and insights for practical management is increasing. The biggest attraction of executive education is that students can directly apply the theoretical knowledge taught in business administration to actual management. In fact, considering that the students who are mainly enrolled in business schools are undergraduates or MBAs, the number of students taking executive MBA is very limited. However, considering the ripple effect they have on the company, the importance of executive education cannot be ignored even from the standpoint of business schools. Professors who teach them may be more desirable to approach with the attitude of learning with them rather than expressing that they teach. Executive-level students may already be ahead of their professors in management knowledge. However, what they want is to have the ability to develop the company one step further with a new perspective based on existing strengths. Therefore, it is desirable for the professor to play the role of an orchestra conductor who stimulates and coordinates so that students participating in executive education can effectively communicate and broaden their learning fields.

Of course, due to the difference between theory and practice, I am not sure whether all the ideas I have in mind can be realized, but I think it would be good to try the ones that can be tried. The question to think about here is, “Will we teach the necessary skills?” or “Will we teach the necessary knowledge?” It seems to be the difference. This is because if the necessary skills are taught to students, business schools can be easily replaced by private academies or YouTube. Therefore, business schools should focus more on teaching students the necessary knowledge.

7. Conclusion

Many universities have experienced financial and operational challenges during the pandemic and even after that. This is partially because students are hesitant to pursue their degrees due to various personal and environmental reasons. As an educator in the school of business, I am also experiencing the big changes in business schools. However, I believe that business education is a long-term investment for our next generation. There are many great opportunities in education for states as well. Since the rules of the game have been changed, the players will also have to change their strategy and gaming styles. In addition, we are experiencing a digital transformation. Thus, students should have an open-minded approach to learning new technologies and new business trends. If business schools will actively promote collaborations between universities and industrial sectors, we will be able to see more meaningful innovations in the future.

Previously, many business schools emphasized two major elements in education. Those are critical thinking and problem-solving. Regardless of majors, these two elements are considered very important in educating business students to the next level. Many companies even emphasize critical thinking and problem-solving styles when they hire employees. However, environmental change urges us to rethink the existing business education model. This is because we are facing many problems that are very

different, severe, and difficult to solve. Therefore, I think that business education should extend the edges of two elements.

First, we need to teach business students what are the origins of problems. To date, problems were already given to students. Because of this, the solutions were there too. If the problems are not fixed variables in the new normal, students should be trained to identify the problems by themselves. Thus, I believe that effective problem identification should be thought up before teaching the critical-thinking process. I also believe that it is important for students to understand foundational knowledge such as philosophy and basic science. Second, we need to teach students what are the outcomes of problem-solving. So far, educators and students were interested in the answers to the problems. However, there are too many answers and solutions in our real life. The problem is that some solutions are useless and meaningless in generating financial value to the customers. Here, we should be careful in determining who is making money and who is not. The key point here is that not every solution is linked to the financial values of the customers. Although making money is not always the answer, this is a very important matter in the business world and the business education. That is why business educators should consider how to create the values after the problem-solving.

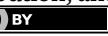
If we go beyond the two edges, things become more complicated. This is because the school of business cannot teach all these elements based on the existing resources. That is why there should be more collaborations between different schools such as the school of education, school of engineering, health science, biotechnology, and liberal arts. There should be more collaborations between universities and industries as well.

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Chapter 13

Theoretical Framework: Entrepreneurial Intention among Students

Chiheb Eddine Inouibli

Abstract

The chapter “Theoretical Framework: Entrepreneurial Intention Among Students” delves into the multifaceted concept of entrepreneurial intention, specifically focusing on students. It explores various theoretical perspectives, models, and empirical findings related to the formation and prediction of entrepreneurial behavior among students. The scope of the chapter encompasses a comprehensive examination of factors influencing entrepreneurial intention, including individual attitudes, social norms, perceived feasibility, and prior experiences. Additionally, it discusses the role of entrepreneurship education programs in shaping students’ entrepreneurial intentions and behaviors. Through an interdisciplinary approach, the chapter aims to provide insights into the complex interplay of psychological, social, and environmental factors that contribute to the development of entrepreneurial intentions among students. By understanding these dynamics, educators, policymakers, and practitioners can design more effective interventions to foster entrepreneurial mindsets and behaviors among the student population, thereby contributing to the promotion of innovation, economic growth, and societal development.

Keywords: entrepreneurial intention, students, theory, entrepreneurship education, behavior analysis

1. Introduction

Entrepreneurship is crucial for the economic, social, and technological development of nations. Entrepreneurs are seen as drivers of a country’s growth as they bring about changes to economic, technological, and organizational environments [1]. Numerous researchers have also agreed that entrepreneurs have positively contributed to their countries by creating businesses and providing new job opportunities [1–3]. As a result, governments worldwide are intensifying their efforts to encourage their citizens to engage in entrepreneurial activities.

Convinced of the effectiveness of entrepreneurship in country development, several governments have also launched various support programs such as funding, physical infrastructure, and counseling services for entrepreneurs to promote an entrepreneurial mindset [4]. Today, in the job market and after their educational

journeys, students find themselves deprived of employment. Thus, entrepreneurship is not only a mechanism for economic development but can also be treated as a solution to unemployment. Although governments and higher education have made various efforts to encourage entrepreneurship among students, many university graduates seem uninterested in entrepreneurship, making the mission of entrepreneurship challenging [5].

It is important to understand what makes an individual become an entrepreneur in order to develop new entrepreneurs. This is because entrepreneurship is a complex process involving entrepreneurial cognition and actions [6, 7]. Furthermore, entrepreneurship is also an intentional and planned behavior [6–8]. As such, it is necessary to further examine individuals' entrepreneurial intention. Several research works found in the literature focus on entrepreneurial intention. Many studies have utilized intention-based theories such as the theory of planned behavior (TPB) or the entrepreneurial event model (EEM) [9–11]. However, there is a lack of consensus in the theory [4].

2. Entrepreneurial intention

In order to renew research efforts that are purely descriptive, various studies have proposed the establishment of a new research avenue, especially focusing on defining the entrepreneurial intention of young students [12–15], along with other researchers interested in the field [16].

Within the framework of this research, we are interested in studying entrepreneurial intention among young students who are concurrently enrolled in entrepreneurship education programs. We use intention as a crucial indicator in the entrepreneurial process.

2.1 Definition of intention

Intention is defined as “the act of proposing a certain goal.” In decided intention, we find “will, determination, resolution” (Le Robert dictionary). In epistemology, intention comes from the Latin verb “intendere,” which means “to tend toward.” It is the will directed toward a certain objective.

According to Gauthier and Tarr [17], intention is a factor in the success of deliberation concerning a future action. Boyer [18] considers intention as a personal will, “a pro-attitude that manifests a positive tendency of the agent toward a targeted state of the world.” Bird [19] relates intention to individual freedom and will; it is a state of mind that guides attention, and consequently, the transition from individual action toward a specific goal (starting a business, launching a venture, decisions regarding growth, development, and mutations). Additionally, the concepts of business creation arise with inspiration; sustained reflection and intention are important to make it manifest [14].

Approaching the same perspective, Neveu [20] describes intention as “a cognitive representation of both a specific goal and the means to achieve it.” According to Carsud and Krueger [21], and Tubbs and Ekeberg [22], intention is a cognitive construct that introduces goals and necessary means. It structures and guides action [8, 19].

Bird [19] defines intention as “a process that arises from individual needs, values, habits, and beliefs.” The author considers that business creation is a direct result of individuals' intentions, which are certainly influenced by environmental factors. Certainly, intention is primarily an individual will, but it depends on contextual variables [23].

2.2 Definitions of entrepreneurial intention

Entrepreneurship is presented as an effective solution to combat unemployment; it is a source of innovation and wealth creation. Many researchers assert that the action of starting a business is preceded by entrepreneurial intention [16].

According to Garthier [24], entrepreneurial intention is the individual's choice to orient themselves toward a specific event. It is interpreted as the affirmation of a distinctive choice concerning a future situation.

Entrepreneurial intention anticipates the transition to action; thus, it reveals behavior [8, 19, 21, 24]. Entrepreneurial intention represents the initial phase of the entrepreneurial act. **Figure 1** below illustrates the process of creating a business.

The model conceptualizes the phases of developing a new business where intention occupies a major position. Emin [16] asserts that by studying an individual's intentions to start a business, it would be possible to predict whether that individual will actually create a company or not.

Douglas and Shepherd [25] observe that the inclination toward risk, the need for independence, and the desire for compensation can drive a new career path. They maintain the idea that both risk-taking and the need for autonomy further enrich the intention to undertake. Researchers like Kuratko et al. [26] state that goals, intentions, and desires are interconnected and predict action.

Thompson [27] states that intention is a variable that is not easy to evaluate due to a lack of measurement, as there is no single definition of intention. It arises from personal determination, awakened and organized, posing an evaluation question.

It is evident that intention is perceived as a predictive variable of any planned behavior. However, this intention remains unstable; it is a dynamic state of thought that experiences variabilities [28].

Consequently, according to Moreau [29], entrepreneurial intention is fluid. This researcher conducted a study on a population of 200 and 10 young French management students and found that intention changes in intensity over time in a more or less probable manner, and attending entrepreneurship education programs and years of work experience also influence students' entrepreneurial intention.

Several researchers emphasize that entrepreneurial action is always preceded by a will or intention to create [12, 16, 21, 30].

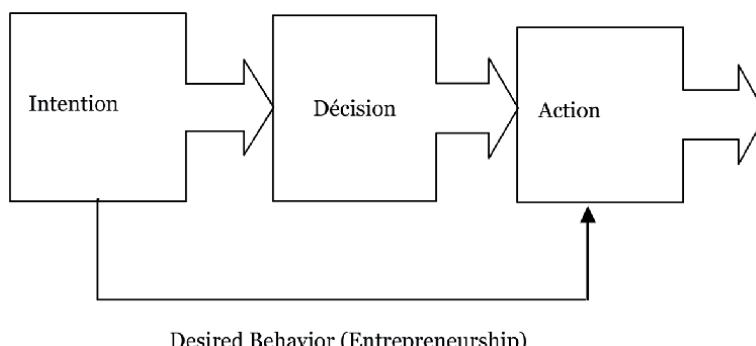


Figure 1.
Process of engagement in entrepreneurial creation ([16], p. 95).

3. Intention models

This section provides a new analytical tool for the process of business creation. It addresses a central concept within this process, entrepreneurial intention. It describes the theories used to predict this intention and presents hypothetico-deductive models explaining intention.

We schematically present five types of entrepreneurial intention models, considered the most commonly used in entrepreneurship research. Firstly, we will mention two models, namely Shapero's model (Shapero's model of the "Entrepreneurial Event," 1975) and Shapero and Sokol [31]. Subsequently, there will be a brief presentation of Fishbein's model (1980).

On the other hand, the theory of planned behavior model by Azjen [28] will be discussed. This model succeeds the theory of reasoned action. The importance given to various models of entrepreneurial intention justifies the reasoning followed for the construction of our study and/or research model.

3.1 Intention models in the entrepreneurship domain

We will mention four models, namely: Shapero's model (1975), Shapero and Sokol's model of the formation of the entrepreneurial event (1982), Fishbein's model (1980), and the theory of reasoned action.

3.1.1 Shapero's model (1975)

Shapero [32] refers to the entrepreneurial process based on intentionality. This model has been adopted, interpreted, examined, and developed multiple times by a significant number of researchers [8, 21, 33, 34]. This shows that attitudes toward entrepreneurship partly stem from prior exposure to entrepreneurial activity. Subsequently, Shapero [32] asserts that these attitudes influence individuals' entrepreneurial intention.

Krueger [33] explains Shapero's model (1975) and extracts two important elements that determine and encourage entrepreneurial action: Firstly, founders of a new venture must ensure the credibility of the creation; they need to harbor an intention to produce and create and primarily believe in the opportunity and seize the entrepreneurial opportunity. Secondly, the researcher emphasizes perceptions of desirability and feasibility, as well as the propensity to act and take action following the opportunity. **Figure 2** depicts Shapero's model (1975):

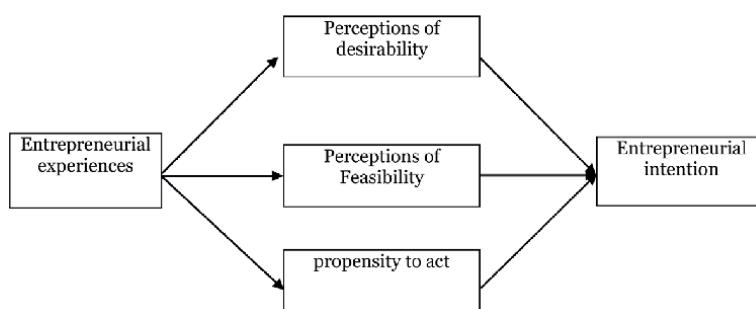


Figure 2.
Shapero's model (1975). Source: Van Auken et al. [35].

3.1.1.1 Perceptions of desirability

Krueger has extensively worked on the concept of “perceptions of desirability,” where he indicated that the outcome of “entrepreneurial experience” is not solely an individual entrepreneur’s responsibility or action; it is a collective consequence inspired by the environment, family, parents, and friends. According to Ajzen [28], “desirability” represents an attitude more or less conducive to choice and decisive decision-making.

On their part, Shapero and Sokol [31] view “desirability” as the degree of attraction of an individual toward the act of entrepreneurship. Indeed, if there is an entrepreneurial role model within a family (father, mother, brother, uncle, etc.), it is likely to have a direct or indirect influence on other members of that family.

The results of Diuchons’ study [36] are in line with these findings. Among nascent entrepreneurs, 46% of these business creators had parents who were entrepreneurs. Thus, Drucker [37] explains entrepreneurship through psychological, sociocultural factors, as well as technological and economic factors.

3.1.1.2 Perceptions of feasibility

Gasse [38] asserted that “feasibility” requires the capacity of the entrepreneur as well as certain factors from their direct environment. He deduced that these factors can interact to influence entrepreneurship. He also affirmed that “feasibility” is linked to a chain of assured and positive perceptions regarding the accessibility of means and the relevance of building a business.

“Perceptions of feasibility” have a relationship with positive preliminary exposures in the works of Krueger [33]. It constitutes the composition of individual facts and specific variables that impact the possibility of the creation event, such as financing, for example.

Furthermore, the approach of credibility and entrepreneurial “feasibility” suggests the degree to which a person believes they can complete the execution of their project. Ajzen [28] describes this in his theory of planned behavior as “perceived behavior control.”

3.1.1.3 Propensity to act

According to Shapero and Sokol [31], when an entrepreneurial opportunity is perceived as effective, the voluntary nature of intention means that one should feel a propensity to act on the opportunity. In fact, it is believed that when the propensity to act is high, the impact of opportunity perception on job assurance becomes stronger, and vice versa.

Following the theory of trial [39], and due to potential bias and self-reported response biases in longitudinal studies [40, 41], we have chosen to use entrepreneurial implementation intention as an indicator of actual behavior. This also represents a more dynamic model that encompasses the pre-birth phase of entrepreneurship compared to studies that consider entrepreneurship as two static ends of a potential entrepreneur’s action (i.e., to act or not to act).

3.1.2 The Shapero and Sokol entrepreneurial event formation model (1982)

The Shapero and Sokol [31] entrepreneurial event formation model (1982), aimed at clarifying the concept of the entrepreneurial event, is considered a foundational and innovative model in the entrepreneurial process. It seeks to consider that the intention to start a business results from perceptions of “feasibility,” “desirability,” and

also from the transition to “action” due to the presence of opportunity [8]. However, the model explains why some autonomous individuals lean toward creating their own businesses, while others gravitate toward employment [42].

3.1.2.1 Variables of the entrepreneurial event model

This model demonstrates that an individual bases their intention to undertake on three reasons: their personal view of the attractiveness of the entrepreneurial “attitude” and “desirability,” their ability to transition to “action” regarding their intentions, and finally, their perception of the “feasibility” of the act and behavior [8, 31].

Figure 3 illustrates the Shapero and Sokol model (1982):

Tounés and Gribaa [43] examines the Shapero and Sokol entrepreneurial event model and identifies its characteristics. “Desirability” manifests an attention to social and cultural elements that stimulate an individual’s value system and participation. Previous experiences and entrepreneurial setbacks previously experienced influence perceptions of “desirability.”

Shapero and Sokol [31] explain “propensity to act” as the individual’s inclination toward taking action. Moreover, “feasibility” is built on perceptions of supportive elements for creation. However, other influential elements exist, such as the availability of suggestions, family support, entrepreneurial competence, and financial means, which prove crucial in perceptions of “feasibility” [14].

However, Shapero and Sokol [31] identify three other significant clusters of factors requiring changes, as indicated in **Figure 3**.

“Negative displacements” denote unpleasant previous experiences such as a breakup, migration, or dismissal. “Intermediate situations” represent events like the end of military service, dropping out of school, or the completion of a prison sentence.

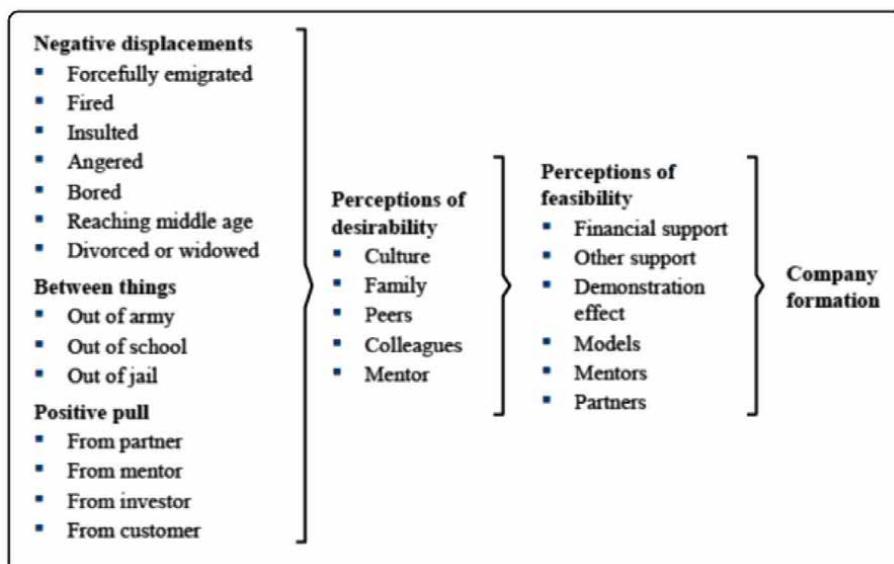


Figure 3.

Entrepreneurial event model [31]. Shapero and Sokol [31] developed a model on variables affecting entrepreneurial intentions. They explained that desirability, feasibility, and a propensity to act are the major factors that control an individual’s intention to create a new venture.

Regarding “positive displacements,” they are rather motivating and involve the impact of family, positive opportunities, the existence of a market, or potential investors.

3.1.3 Fishbein’s model (1980)

Fishbein’s model (1980) is considered among the most common models in journals related to entrepreneurial intention and action, and it is used to predict intentional behavior in many disciplines. Since the model was formulated to predict personality traits, the certainty of reinforcing the validity of its construction has become very limited and narrow [44].

The model is used to develop certain attitudes in individuals and proposes strategies to change or improve these behaviors [45].

3.1.4 Theory of reasoned action

Ajzen and Fishbein’s [1, 2] (1975, 1980) theory of reasoned action introduces two concepts describing behavior. The first component, of an emotional nature, manifests through attitudes. Indeed, according to Fishbein and Ajzen [45], attitude can be rationalized as the degree of positive or negative affect toward something. The second component is cognitive in nature and refers to the beliefs of the individual.

3.2 Ajzen’s theory of planned behavior (1991)

In 1991, Ajzen developed a model titled “theory of planned behavior” (TPB), which is widely regarded as the best approach for planning behaviors in cases where they are difficult to perceive, observe, and access [8].

The theory of planned behavior (TPB) is an extension of the theory of reasoned action proposed by Ajzen and Fishbein [45]. The central element of the TPB is the concept of “intention.” According to Ajzen, intention explains the “intensity” with which an individual is willing to try, the level of effort they plan to invest in choosing a behavior [28]. Therefore, the stronger the intention to adopt a behavior, the more likely it is to be carried out.

Ajzen’s TPB [28], depicted in **Figure 4**, demonstrates that intention predicts behavior through three variables: attitudes, subjective norms, and perceived behavioral control.

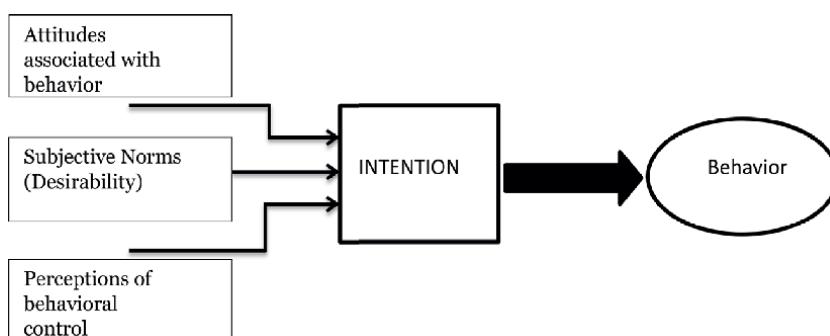


Figure 4.
Model of Ajzen’s theory of planned behavior ([28], p. 182).

Attitudes associated with behavior refer to the degree of favorable or unfavorable evaluation that the individual holds regarding the desired behavior. These attitudes generally depend on the expected outcomes of the behavior in question [28].

Subjective norms result from the individual's perceptions of their social and environmental context and the pressures from people close to them, especially family and friends, regarding the individual's intention [14].

Lastly, perceived behavioral control is a significant, important, and direct predictor of behavioral action. It encompasses perceptions of the availability of resources, opportunities, anticipated obstacles, and necessary skills [46].

In the context of our research, the models mentioned above, developed by Shapero, Sokol, and Ajzen, will be of particular interest as they have already been validated by several empirical studies to understand the entrepreneurial intention of university students.

4. Empirical results from the literature on the entrepreneurial intention model

Kolvereid [47] conducted a study on a sample of around 100 students at a Norwegian business school and found that the intention to start one's own business is significantly related to attitudes toward behavior, subjective norms, and perceived behavioral control. However, individual sociodemographic variables did not have significant effects on intention, although they were related to subjective norms and perceived behavioral control.

On the other hand, Krueger et al. [8] adapted Ajzen's model in the USA, examining attitudes and perceived feasibility toward behavior, and found results approximately similar to Kolvereid's, namely that feasibility has a more significant impact on entrepreneurial intention than behavioral attitudes. However, contrary to Kolvereid's findings, Krueger et al. asserted that subjective norms do not have a real and significant influence.

Reijonen et al. [48] conducted a study on entrepreneurial intention showing that 90% of Mexicans in "Little Village" (USA) had at least some idea of undertaking projects. Similarly, Filion's study [49] on a population of 483 students from HEC and Polytechnique schools in Montreal demonstrated that parents play a significant role in stimulating their children's entrepreneurial intention. Moreover, there is also a positive effect of friends, although it is much less pronounced than that of parents.

Kennedy et al. [50] demonstrated that entrepreneurial intention competes with other intentions among students. In a survey involving 15 students with strong intentions, they were asked to chart the trajectory of their entrepreneurial intentions from the age of five. The existence of different trajectories justified the change in intention over time due to various factors and experiences.

Shein [51] showed that feasibility and desirability both appear and determine the intention to launch a project, explaining 53% of the variance in a survey of 1075 Australian students.

Eyüboğlu [52] explained that the career paths of young students are clarified by five necessary factors, including the need for stability and security, the need for maturity, the need for autonomy, and the need for vertical instability, after conducting a study on the career trajectory of a group of certified students over a period of 20 years [53].

Kolvereid observed that students generally aim to start a business in their field. As a spectrum of professions, entrepreneurship is becoming an increasingly favored option among the youth, although traditional employment remains less of a priority [47]. Therefore, entrepreneurship education programs aim to guide students toward starting or taking over an organization or business.

5. Conclusion

These empirical results highlight the complex interaction between individual attitudes, social and familial influences, as well as perceived feasibility factors in the formation of entrepreneurial intention. They also underscore the importance of considering these different elements in understanding and predicting entrepreneurial behavior. By better understanding these factors, it becomes possible to develop more effective programs and policies to encourage and support entrepreneurship among young people and aspiring entrepreneurs.

Conflict of interest

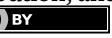
The authors declare no conflict of interest.

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