

Developing Enterprising Graduates in the Fourth Industrial Revolution: Implications for South African Higher Education Institutions

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Due to the global prevalence of youth unemployment and the increased demand for enterprising graduates, university-based entrepreneurship education which began several decades ago in the United States is now widely acknowledged and popular in many nations. Accordingly, the pressure created by the pandemic era also necessitates that universities produce graduates who are well-equipped with the essential skills and competencies needed to address current and future challenges. This study employs the use of systematic analysis of literature to explore the common elements that exist in some of the world's most successful entrepreneurial training models. The authors specifically reviewed a number of successful entrepreneurial training strategies from top-tier higher education institutions from 5 countries across 3 continents. The analysed training models differ in their designs. However, despite these variances, certain commonalities such as the use of live projects and the apprenticeship system, as well as pedagogical innovation are acknowledged. The study offers compelling evidence of how South African higher education institutions could incorporate global best practices into their teaching approaches.

Keywords: skills acquisition, higher education, innovation, entrepreneurship education

JEL Classification: M10

1. Introduction

The rising global importance of entrepreneurship education is becoming evident as academics continue to conduct conferences to advocate for the development of entrepreneurial societies through higher education (Uleanya et al., 2022). A critical assessment of the report of the United Nation Educational, Scientific and Cultural Organisation indicates that entrepreneurship education stimulates the development of skills required for nation-building (UNESCO, 2020). In other words, a robust entrepreneurship education program is critical to national development. According to Lauder & Mayhew (2020), the essence of higher

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education institutions in the fourth industrial revolution is to be actively connected to the business sector and stakeholders, so that students could acquire 21st-century skills, while the institution benefits from the information gained as a result of its proximity to the entrepreneurial environment. Hence, the foregoing establishes a relationship between the university and the corporate sector, it also allows students to share their skills, and learn via experience. According to Wei, Liu & Sha (2019), university-level entrepreneurship education in the digital age aims to empower students to graduate with the capacity to think creatively, investigate possibilities, and transform ideas into values. This implies that university graduates of today should be more enterprising in order to fulfil the demands of the fourth industrial revolution.

However, in South Africa, Ratten & Jones (2021) note that universities are more concerned with funding formulae, enrolment levels and the number of graduates produced every year. In other words, there is little emphasis on nation building which is the primary goal for which educational institutions are established. In congruence, Ikuemonisan, Abass, Feleke & Ajibefun (2022) submit that in spite of the huge financial resources committed to teaching and learning in the higher education sector, the universities have not reciprocated by producing highly skilled graduates, as a result, employers are puzzled about the quality of graduates being produced from universities. This circumstance is not only associated with South Africa, youths in other developing African nations are equally bedevilled by skills gap (Morselli, 2018). In other words, a fundamental challenge for the continent's adolescent workforce is skills deficit, which creates entry barriers in a variety of industries. To solve this issue, Coulibaly (2020) notes that efforts by the government, academics, and other stakeholders are urgently required. Additionally, it is imperative to investigate what it takes to groom enterprising graduates in the context of a university (Doringer, 2020). Thus, the overarching goal of this study is to identify the common elements that exist in some of the world's most successful entrepreneurial training models. This objective was accomplished by analysing the characteristics of highly successful entrepreneurial skills acquisition strategies from top-tier higher education institutions around the world.

2. Theoretical Framework

The Entrepreneurship University Framework is an integrated theory that consists of three critical components: internal support factors, external support components, and entrepreneurial university outcomes (Scott & Ivala, 2019). The theory is founded on the fundamental premise that a higher education institution can only be deemed entrepreneurial if it contains the essential features of an entrepreneurial university (Sansone et al., 2021). According to Lackeus, (2020), the external environment is regarded as the most significant component of the proposed framework based on its utmost relevance to entrepreneurship theory. The word "external environment" refers to the current external elements that have a significant influence on a firm, these elements include institutional, legal, and administrative environments (Salem & Mobarak, 2019). Furthermore, the internal environment is a critical component that influences the quality of academic output in a business. Several scholars such as Ramnund-Mansingh & Reddy, (2021) and Oanda & Ngcwangu (2018) attempt to promote an entrepreneurial university theory by taking into account a variety of criteria. As a result, emerging literature suggests that an entrepreneurial university should exhibit the following characteristics: group entrepreneurial projects, incentivising entrepreneurial behaviour, pedagogical innovations, non-curricular activities, and entrepreneurial training for academic and non-academic staff, mentorship programme, investment competitions, and interaction with professionals from corporate organizations. The foregoing indicates that the university entrepreneurship theory is based on the notion that the more entrepreneurial an institution is, the more enterprising graduates it can produce.

3. Research Methodology

This study employs the use of systematic analysis of literature to explore the common elements that exist in some of the world's most successful entrepreneurial training models. The authors specifically reviewed a number of successful entrepreneurial training strategies from top-tier higher education institutions from 5 countries across 3 continents. There are numerous entrepreneurial universities across the globe, however, only the entrepreneurial universities with unique characteristics were purposefully selected for this study. Secondary data was collected on the topic under study through desktop research. In order to ensure the trustworthiness of information obtained from various sources, only current literature from articles, thesis and dissertations and book chapters were retrieved using advanced search keywords.

4. Literature Review

This section focuses on the review of literature on the characteristics of successful entrepreneurship education programmes around the world. The analysis of the literature is divided into the subsections that follow: group entrepreneurship programme and team mentorship, apprenticeship training and pedagogical innovation, customised enterprise training for non-business students and incentivising entrepreneurial behaviour.

4.1 Group Entrepreneurial Projects & Team Mentorship

One of the basic hallmarks of entrepreneurial university is the inclusion of group entrepreneurial projects enriched by team mentorship programmes. Harvard University is globally acknowledged for vibrant group entrepreneurial projects. According to Arshi et al., (2020), mentors are provided as part of the Harvard university curriculum, the project-based courses differ from typical classroom work in how they blend theory and practice. Arshi et al., (2020) further submit that Harvard instructors deliver theoretical frameworks, that aid students in understanding how to handle real-world business difficulties, such as how a distributor may improve its supply chain. The foregoing indicates that it is crucial not to lose sight of the underlying theory and it is even essential that lectures and assignments be applied to the project at the proper moment. This submission was supported by Asenahabi (2019); Ibrahim et al., (2021) as well as Vezi-Magigaba (2018) who opine that Harvard University's project-based learning connects students with corporate organizations. It is a fantastic approach used by trainers to increase the learning experiences of students. According to Villa et al., (2022) classes that incorporate real-world and experiential projects promote lifetime learning as well as helping students discover intriguing job opportunities, in addition, students also get experience in soft skills such as networking and teamwork, as well as analytical thinking and budgeting.

The authors point out that another institution, Cambridge University, offers an entrepreneurial mentoring programme in the form of a support system that students need to gain a sustainable competitive advantage in the business world (Georgescu & Herman, 2020). This indicates that the Cambridge mentorship program addresses a set of difficulties that most student entrepreneurs are neither prepared for nor capable of handling (Villa et al., 2022). In line with the foregoing, Ranwala (2017), as well as Ratten & Usmanij (2020), posit that the Cogswell College immersion adventure program provides students with an intensive experience that introduces them to a flourishing business community. In other words, an immersion program allows students to gain hands-on experience in the field of entrepreneurship training. According to Breed & Mehrtens (2021), the goal is to provide students with entrepreneurial experience and insights into the breadth and complexity of business life. In congruence, Lackeus (2020) submits that this experience does not mandate students to start a venture when the programme is completed, but rather equips students with core entrepreneurial skills. This implies that it may be up to each student to determine whether or not they have a natural drive to launch a new business. As a vital aspect of the enterprise training approach, the student's experience and intellectual grasp of entrepreneurship can actually be left within their reach (Schimperna et al., 2021). The foregoing analysis indicates that the programme of Cogswell College bridges the gap between students and successful entrepreneurs.

4.2 Apprenticeship Training & Pedagogical Innovation

Sequel to the review of literature, the authors acknowledged the superlative entrepreneurship training at Stanford University in the United States. Stanford is devoted to experiential training and school-based collaboration in the Silicon Valley region, as well as promoting the concept of the apprenticeship principle (Geza et al., 2022). According to Kamran et al., (2020), Stanford University has assisted a number of technology entrepreneurs to develop customised entrepreneurship education strategies. This implies that Stanford University blends professional knowledge and technology to provide technology entrepreneurship courses in order to develop skills, and foster knowledge transformation, and technological advancement. In other words, Stanford combines education with the external science and technology entrepreneurial environment to identify potential business opportunities and markets.

According to Mehmood et al., (2019), Stanford's unique training model offers similar technology entrepreneurship courses to students at all levels, linking entrepreneurial learning with practice. Mehmood et al., (2019) further submit that Stanford University combines learning with the Silicon Valley experience and

the outside high-tech environment, so students can immerse themselves in the real atmosphere of science and technology entrepreneurship.

In this regard, the authors also recognised the apprenticeship training model at Morgan State University. Jardim et al., (2021) note that the university apprenticeship model integrates numerous features that enhance its success. In congruence, a group of scholars such as Antonia & Pinto (2022) as well as Sulistyani & Suhariandi (2022) submit that the Morgan State University apprenticeship training programme involves optimal student participation and team work, students are put in a lab where they perform and learn a specific research technique, gradually achieving proficiency and independence. Conversely, Almeida et al., (2021) opine that while the apprenticeship model has helped many prominent scientists over the years, one possible disadvantage is that trainees may not comprehend how their efforts contribute to the larger project goals, and some may dispel the idea of continuing a career in entrepreneurship. Hence, the Morgan State University apprenticeship training paradigm empowers students to take charge of their projects. The laudable projects can be replicated at other universities.

In terms of pedagogical innovations, Cohen et al., (2021) note that Cambridge University has a strong interest in the growth of entrepreneurial education in the sciences, Cohen et al., (2022) further posit that Cambridge places a premium on the advancement of entrepreneurship education and cultivates a cultural climate that supports entrepreneurship, strives for goals, and tolerates start-up failures, resulting in a healthy business environment that is gradually built. With regards to gaining entrance into markets, Dada et al., (2022) submit that Cambridge offers adaptable entrepreneurship training to improve knowledge and the ability to find potential markets. This implies that Cambridge University blends lectures and practice to stimulate student innovation and creativity while also assisting students in gaining market access.

The author also notes that the success of Tsinghua University, China in the production of enterprising students is unrivalled. According to Gao et al., (2020), numerous indicators echo the success and effectiveness of Tsinghua X-Lab; Over 8000 students have participated, over 580 live projects have emerged from the Lab, and approximately 40% of graduating students initiate tangible entrepreneurial projects upon graduation. In congruence, Greenberg et al., (2020) note that Tsinghua University X-Lab has 229 registered enterprises that employ over 5000 people. Thus, X-Lab offers a series of pedagogical innovations which enable the institution to exert tremendous influence on students in terms of ideas generation and transformation of ideas into sustainable entrepreneurial projects.

4.3 Customised Enterprise Training for Non-Business Students

A prominent innovative model of enterprise training discovered by authors in this review is the University of Finland Teacher-Entrepreneur Speed Dates, which promotes entrepreneurship amongst teachers. According to Guindalini et al., (2021), the goal of this effort is to connect accomplished entrepreneurs with prospective teachers in order to facilitate the transfer of skills. Guindalini et al., (2021) further note that teacher-entrepreneur speed dating is a business-friendly branch of the Finnish university network, the training takes place in a casual and pleasant setting, and it enables participants to get ideas and valuable entrepreneurial information. This implies that teacher-entrepreneur speed dating assists practitioners and prospective entrepreneurs in taking the initial step toward getting to know one another. Hence, the project encourages entrepreneurial thinking among Finnish teachers.

In congruence, Gurau et al., (2020) posit that enterprise education and new teaching strategies are critical to successful teacher training, the programme also allows teachers to share their own resources with business practitioners from around Europe. The Finnish University Speed Dates, according to Makka & Nieuwenhuizen (2019) equips teachers with world-class entrepreneurial knowledge, the benefits of this initiative are twofold; it enables teachers to transfer entrepreneurial skills to their students as well as enables teachers to operate as employers of labour. This implies that the initiative provides a fair indication of the possibilities of incorporating entrepreneurial education into teacher training programmes.

Additionally, Stanford University also offers a tailor-made entrepreneurial training curriculum. The university has a unique package that enhances enterprising behaviour amongst engineering students. According to Nabi et al., (2018), Stanford incorporates entrepreneurship education into practical curriculum design, fosters technology entrepreneurship, and provides engineering students with support activities. This indicates that Stanford combines entrepreneurship education with a high-tech entrepreneurial environment,

which helps to develop students' knowledge of the markets and translate technological achievements into productive market forces.

4.4 Incentivising Entrepreneurial Behaviour

Following the analysis of the literature, the authors note that student entrepreneurial behaviour could be enhanced by creating enabling environment for entrepreneurial activities on campus. In this regard, Robinson et al., (2019) note that Babson College is a world-renowned leader in entrepreneurial education. According to Tas et al., (2022), Babson University incentivised entrepreneurial behaviour through the combination of tradition and innovation, emphasising the development of skills amongst students. In other words, the students study business education and practice on a continuous basis. In line with the foregoing, Tiemensma & Rasmussen (2019) posit that Babson University reinvents the style of entrepreneurship education based on the characteristics of students, this ideal increases entrepreneurial practice both inside and outside of the classroom. This suggests that Babson's curriculum structure is student-centred, focusing on building entrepreneurial spirit and talents.

In this regard, the Massachusetts Institute of Technology has also been identified as a notable example of an institution that stimulates entrepreneurial behaviour among students through entrepreneurship competition. According to Vermeulen (2019), the MIT \$100,000 entrepreneurship challenge is a student-managed business competition in which undergraduates and postgraduates from all faculties and levels compete. As a result of this entrepreneurship competition, Doring (2020) submits that over 160 new enterprises have been created, which have generated about 4,600 employments. A group of scholars such as Wei, Liu & Sha (2019), posit that the tournament was originally intended to be a promotional tool for MIT Entrepreneurs, the promoters envisioned a cross-campus event that would enable students to discover and promote innovative ideas. In other words, the main objective was to create a safe, nurturing environment in which emerging entrepreneurs might fledge their wings.

The foregoing is similar to Texas University Investment Competition, Morselli (2018) describes this competition as a platform on which students produce ideas that can be developed into real business concepts, Morselli (2018) also notes that Temple University and the University of Paris operate similar investment competitions. According to Coulibaly (2020), Texas University Investment Competition is a process in which an entrepreneurial community encourages students to generate entrepreneurial concepts and work toward their growth with special reference to a company model, strategy, and space. A group of scholars such as Khalatur, Masiuk, Kachula, Brovko, Karamushka & Shramko (2021) submit that the enterprise investment contest is a student-run competition that is accessible to all University of Texas students, regardless of level or academic field, above-all the success of the contest, is linked to the propensity to foster technology-focused entrepreneurship. A panel of judges selects concepts created and developed by student teams. This suggests that Texas University Investment Contest promotes capacity building, skill development, and exposure to entrepreneurial-minded people from far and wide.

Table 1: Analysis of the reviewed entrepreneurial training models

Programme	Location	Major Characteristics	References
1.Harvard University Project-Based Learning	USA	Group entrepreneurship projects and team mentorship programme.	Arshi et al. (2020), Asenahabi (2019); Ibrahim et al. (2021); Vezi-Magigaba (2018); Villa et al. (2022)
2.Stanford University Apprenticeship Model	USA	Customised enterprise training for non-business students.	Geza et al. (2022); Kamran et al. (2020), Mehmood et al. (2019)
3.Babson College Entrepreneurial Skills Acquisition Model	USA	Incentivising entrepreneurial behaviour and creating enabling environments for entrepreneurial activities on campus.	Robinson et al. (2019); Tas et al. (2022), Tiemensma and Rasmussen (2019).
4.Morgan State University Training Model	USA	Apprenticeship training and Pedagogical innovation	Jardim et al. (2021); Antonia and Pinto (2022); Sulistyani and Suhariandi (2022); Almeida et al. (2021).

5. Cambridge University Entrepreneurial Training Model	United Kingdom	Group entrepreneurship projects and team mentorship programme.	Geogrscu and Herman (2020); Villa et al. (2022); Ranwala (2017); Ratten and Usmanij (2020); Breed and Mehrtens (2021); Lackeus (2020); Schimperna et al. (2021).
6. Cogswell College Immersion Adventure	USA	Pedagogical innovation and team mentorship programme.	Ratten and Jones (2021); Salem and Mobarak (2019); Sansone et al. (2021)
7. Massachusetts Institute of Technology Entrepreneurship Competition	USA	Incentivising entrepreneurial behaviour and creating enabling environments for entrepreneurial activities on campus.	Vermeulen (2019); Doringer (2020) Wei, Liu and Sha (2019).
8. Texas University Enterprise Investment Contest	USA	Incentivising entrepreneurial behaviour and creating enabling environments for entrepreneurial activities on campus.	Morselli (2018); Coulibaly (2020); Khalatur et al. (2021)
9. Temple University Competition	United Kingdom	Incentivising entrepreneurial behaviour and creating enabling environments for entrepreneurial activities on campus.	Lackeus (2020); Schimperna et al. (2021).
10. Cambridge University Mentoring Programme	United Kingdom	Apprenticeship training and Pedagogical innovation.	Cohen et al. (2021); Cohen et al., (2022); Dada et al. (2022)
11. Paris Entrepreneurial Innovation Challenge	France	Incentivising entrepreneurial behaviour and creating enabling environments for entrepreneurial activities on campus.	Ibrahim et al. (2021); Villa et al. (2022).
12. Tsinghua University X-Lab	China	Incentivising entrepreneurial behaviour and creating enabling environments for entrepreneurial activities on campus	Gao et al. (2020); Greenberg et al. (2020).
13. Finnish University Speed Dates	Finland	Customised enterprise training for non-business students.	Guindalini et al. (2021); Gurau et al. (2020); Makka and Nieuwenhuizen (2019)

5. Discussion and Conclusion

The in-depth review of the literature suggests that the successful entrepreneurship training models of universities around the world reflects certain unique element such as pedagogical innovations, group entrepreneurial projects, customised entrepreneurial training for non-business students, incentivising entrepreneurial behaviour and apprenticeship training models. The findings of the study draw from several training models, with unique approaches to entrepreneurship education, which provides a platform to compare best practices among top-tier universities in the United Kingdom, United States, France, Finland and China. Historically, the United States is renowned as a pacesetter in entrepreneurial training. Finland has been applauded globally for its innovation at levels of education while China has maintained its long-standing position of highflier in commerce and education.

The findings indicate that the expectations and aspirations of stakeholders in higher education differ from one society to another (Ratten & Jones, 2021). In most of the universities in the United Kingdom, the United States and China, entrepreneurship programme is delivered primarily to stimulate the production of new entrepreneurs (Doringer, 2020). Whereas, in Finland institutional entrepreneurship models focus on increasing students' ability to innovate (Salem & Mobarak, 2019). This could be the reason why Sansone et al., (2021) posit that the entrepreneurship training model of each university draws from the sociocultural needs of society.

In this regard, the analysis of unique training models reveals an array of best practices and relevant implications for policy and practice. The analysis reflects the uniqueness of co-curricular activities and

delivery mechanisms. An in-depth analysis of the literature demonstrates a link between the sociocultural terrain and the choice of entrepreneurial skills training model required for each given society (Ibrahim et al., 2021), the outcome of the study further affirms that no single entrepreneurship training programme is dynamic enough to suit students from all national backgrounds (Villa et al., 2022). The reviewed training models differ in their designs, but despite these variances, there are certain commonalities, such as the use of live projects and the apprenticeship system, as well as pedagogical innovation.

6. Conclusion and Policy Implications

The study explores the common elements found in the entrepreneurship education programmes of top-tier universities around the world. The findings highlight the need of repositioning South African institutions as hubs for producing graduates who are well-equipped with the necessary skills to compete favourably in the fourth industrial revolution. The authors observe that the average South African graduate is more likely to work as an employee than as an entrepreneur. Hence, South Africa has a long way to go to step up the ladder in terms of producing enterprising graduates. This scenario undoubtedly reflects the current circumstances of other emerging African nations. The findings in this study indicate a rethink of processes required to stimulate the development of globally relevant skills in the context of a university. This might pave way for the creation of vibrant entrepreneurial training models which could stimulate the production of enterprising graduates in South Africa. The authors argue that universities are strategically located to address contemporary issues in their host communities. As a result, South African universities must reconsider the core rationale for their existence. A full reform of entrepreneurship training methods at South African universities is critical to producing graduates who can compete well in both the local and global labour markets.

On the basis of the analysis above, the following policy implications are proffered:

- Entrepreneurial behaviour among university students should be incentivised in order to inspire university students to pursue entrepreneurship as a career.
- Traditional teaching methodologies at South African institutions should be modified to meet students' current demands.
- The entrepreneurial mentorship programme needs to be embraced as a critical element of the university entrepreneurship training programme.
- Outdoor learning adventures such as business tours, innovation challenge and investment competitions should be established on campus to foster entrepreneurial spirit amongst students.
- The use of group entrepreneurial projects for teaching and learning is a universal practice which has proven to be a prominent hallmark of an entrepreneurial university. South African universities should take advantage of this phenomenon which is required to help students acquire 21st-century skills.

6.1. Future Research

The research is undoubtedly inconclusive; hence more studies are needed. Hence, the following questions are proposed to motivate future research. It will be worthwhile for empirical research to be conducted to address the factors influencing the production of enterprising university graduates in South Africa.

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