Aspects Considered Relevant in Higher Education Curriculum to PRODUCE Business Innovative Graduates

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Abstract: Higher Education Institutions (HEIs) have been tasked with the responsibility to generate knowledge through research and educate students and **PRODUCE** graduates with the capability to innovate and develop business innovation through entrepreneurial teaching. Therefore, it is significant for a university to align itself with the needs of the industry to **PRODUCE** graduates with the capability to **PRODUCE** business innovation. The purpose of this research was to determine aspects considered relevant in the Higher Education curriculum to **PRODUCE** graduates ready to develop business innovation and become entrepreneurs. The mixed-method research approach was deemed suitable for this research, therefore both qualitative and quantitative data were collected through the use of semi-structured interviews with 11 participants from the University of Johannesburg commercialisation units and an online questionnaire from 69 innovation experts from the South African Business Innovation Community (Innovation Summit), and the Innovation, Sustainability, and Visionary Leadership Group. The data collected was then analysed through descriptive content analysis and statistical analysis. This study is part of a PhD study completed in 2022 and only the results about the aspects considered relevant in the Higher Education curriculum to **PRODUCE** graduates ready to develop business innovation are presented and discussed. Based on the findings it is significant to note that aspects, such as creativity; originality and initiative; critical thinking and analysis; analytical thinking and innovation complex problem solving; and entrepreneurship are relevant and suitable for the university curriculum. In conclusion, more emphasis should be reflected in the Higher Education curriculum on these aspects mentioned above to **PRODUCE** graduates ready and capable of developing and producing business innovation. Higher Education Institutions should regularly implement interventions to improve their curriculum to best suit the needs of the industry or the business sector.

Keywords: Higher education institutions curriculum, Graduates, Business innovation, Entrepreneurship

1. Introduction

Universities play a significant role in promoting entrepreneurship, and innovation, ensuring that graduates are ready to contribute to the innovative industry, and thus they need to have university entrepreneurial structures (Rooke, 2017; Liu, Walley, Pugh, & Adkins 2020). Although there is no single definition for entrepreneurship, there are more common descriptions of what an entrepreneurial university is. An entrepreneurial university is an HEI that thrives through its curriculum design, teachings, research, support units, community engagement, Work-Integrated learning (WIL), and information management approach to build entrepreneurial leadership and business development skills with the involvement and support from external bodies, such as the government and commercial-driven entities (Chugh, 2013; Brink, Mearns & Du Plessis, 2014; Jameson & O'Donnell, 2015; Rooke, 2017; Liu et al., 2020). Entrepreneurial universities are purposefully designed to promote and support students and staff to be enterprising individuals, inventive and creative through teaching and learning, and through research. This is all in the pursuit to create and use knowledge across their boundaries (Jameson & O'Donnell, 2015). Most university students are deemed to not fit to contribute to business innovation after graduating from their studies, this means most of them lack innovative skills and expertise.

It is therefore significant for university to align itself with the needs of the industry to **PRODUCE** graduates with the capability to **PRODUCE** business innovation. This can be achieved through curriculum reassessment and design to suite some of the industry needs while maintaining its values and principles. This research paper aimed to determine aspects considered relevant in the Higher Education curriculum to **PRODUCE** graduates ready to develop business innovation or become entrepreneurs.

2. Literature Review

Entrepreneurial universities put more emphasis on ensuring that people in their pursuit to be innovators, creators, and enterprising minds, are well empowered through teaching and various other support systems. For a university to have entrepreneurial characteristics, depends on the extent to which innovators come up with innovative ways to improve the well-being of the world or their immediate society. Simply put, an entrepreneurial university is an institution that builds its environment with the intent to apply an

entrepreneurial mind-set and encouraging behaviours associated with an entrepreneurial culture, where even rewards are granted (Jameson & O'Donnell, 2015).

Jameson and O'Donnell, (2015) identified the seven pillars that entrepreneurial universities' practice can be evaluated on:

- Governance and leadership.
- People involved, along with the capacity of an organisation and the incentives or rewards.
- The development of entrepreneurship and its inclusiveness in the curriculum.
- Various pathways and support systems for entrepreneurs.
- The collaborative efforts between HEI and external business parties to exchange knowledge.
- The internationalisation of the entrepreneurship institution.
- The way the entrepreneurial university's impact is measured.

The focus of an entrepreneurial university is to ensure that acts of entrepreneurship are embedded within the institution's DNA, across the entire institution, concerning disciplines and management (Rooke, 2017; Liu et al., 2020). An entrepreneurial university is represented by the act of transforming the functions of an institution to more entrepreneurship-based operations that include psychological ownership (Chugh, 2013). This is to ensure the viability of innovations that can adapt to the changing business environment, society, and stakeholder needs, in a manner that is sustainable and improves the aspect of student experience (Jameson & O'Donnell, 2015).

Universities are different from other entities; due to the HEI promotion system and governance, research academics play vital roles in the process of entrepreneurship education (Simmons & Hornsby, 2014). University entrepreneurship can differ from corporate innovation spin-offs and other business ventures. The level of governance, competitiveness, motivations, and systems form clear performance indicators of academic entrepreneurship and sometimes they are complex. In other instances, some other commercialised innovations that are derived from university knowledge are never disclosed, be it due to the lack of a platform or of a structure or something else (Soltanifar, Hughes, & Göcke, 2021). Furthermore, universities may prefer to only engage in external businesses that are already existing and support them.

3. Methodology

This research paper presents a component of a larger PhD study, which was on innovation and commercialisation dynamics of entrepreneurial universities. A Signification Framework was used as a method for this research, this methodology refers to a structure for underlying systems, concepts, and text representing the world philosophies and perception of researchers, it is not normally utilised to represent the meaning and applied sensemaking (Deprez & Hanchar, 2017; Magoma, 2018). A Signification Framework aims to make sense through five elements namely, Presume, Predict, Prize, Perceive, and **PRODUCE**, with their unique meaning and purpose. This paper only reports on the data from the **PRODUCE** element, with its description meaning to lead to or cause a specified thing to happen or exist, this further refers to aspects considered relevant to PRODUCE graduates ready to develop business innovation. This paper is further supported by pragmatism as a philosophical paradigm, which allows the researcher to explore real-world practical ways that can work and improve university curriculum for the benefit of graduates.

A Mixed-method research approach was utilised for this study, data was collected using both qualitative and quantitative methods through semi-structured interviews with 11 participants from the University of Johannesburg commercialisation:

- Project Management Office.
- Commercialisation & Technology Transfer Office.
- UJ Centre for Entrepreneurship.
- UJ Izindaba Zokudla.
- Process, Energy & Environment Technology Station (PEETS).
- Technopreneurship Centre.
- PurpleGrowth.
- Close the Gap: Social enterprise.
- IKM alumni entrepreneurs.

Furthermore, an online questionnaire was distributed to 100 participants and a response was obtained from 69 innovation experts from the South African Business Innovation Community (Innovation Summit), and the

Innovation, Sustainability and Visionary Leadership Group. The population sample ranged from, company representatives, Managing Directors, academics, company founders, board member, Chief Executive Officers, government representatives, Chief Operating Officer, entrepreneurs, creative director, learning manager, filmmaker and editor, lead consultant, mentor, business analyst chief of section, mentor and Ambassadors from the Vice Chairperson in the Northern Lights Northern Conference of South Africa's Youth Committee, business development, marketing and sales. Descriptive content analysis and statistical analysis were used to analyse the data collected.

Permission was granted by the College of Business and Economics Research Committee (CBEREC) with a clearance code and a clearance number (IKM2018_023) was appointed. All research participants were given informed consent forms to obtain permission to conduct research and as part of ethical consideration.

4. Results and Discussion

The results address the research objective "To determine aspects considered relevant in the Higher Education curriculum to PRODUCE graduates ready to develop business innovation"? As mentioned above and described, the research participants were given the Signification Framework terminology where the element **PRODUCE** means "to lead to or cause (a specific thing) to happen or exist". Thus, this question or Signification Framework element refers to **PRODUCE**, that is, to lead to or cause a specific thing to happen or exist. Four options were given to the respondents: to no extent, to some extent, to a moderate extent, to a great extent. It is significant to note only a small portion and relevant qualitative data is integrated into this paper, this is to support the quantitative data presented. The 13 components shown on the category axis were:

1. Strategic information management.
2. Artificial intelligence.
3. Entrepreneurship.
4. Advanced business management.
5. Systems analysis and evaluation.
6. Big data and analytics.
7. Analytical thinking and innovation.
8. Creativity, originality, and initiative.
9. Technology design and programming.
10. Critical thinking and analysis.
11. Leadership and social influence.
12. Complex problem solving.
13. Emotional intelligence.

The results on each of these components are illustrated in Figure 1.

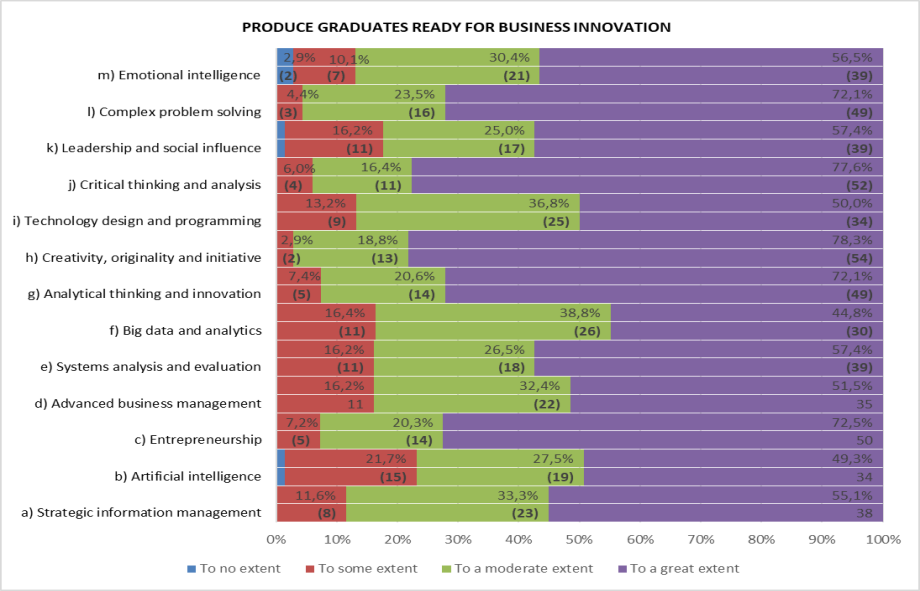


Figure 1: Aspects considered relevant in the Higher Education curriculum to PRODUCE graduates ready to develop business innovation (own source developed for this study, 2021)

The results in Figure 1 illustrate at a) on strategic information management, none of the participants indicated to no extent, 11.6% indicated to some extent, 33.3% indicated to a moderate extent, 55.1% indicated to a great extent. Figure 1 at b) on artificial intelligence, 1.4% of the participants indicated to no extent, 21.7% indicated to some extent, 27.5% indicated to a moderate extent, 49.3% indicated to a great extent. Figure 1 at c) on entrepreneurship, none of the participants indicated to no extent, 7.2% indicated to some extent, 20.3% indicated to a moderate extent, 72.5% indicated to a great extent. Figure 1 at d) on advanced business management, none of the participants indicated to no extent, 16.2% indicated to some extent, 32.4% indicated to a moderate extent, 51.5% indicated to a great extent. Figure 1 at e) on systems analysis and evaluation, none of the participants indicated to no extent, 16.2% indicated to some extent, 26.5% indicated to a moderate extent, 57.4% indicated to a great extent. Figure 1 at f) on big data and analytics, none of the participants indicated to no extent, 16.4% indicated to some extent, 38.8% indicated to a moderate extent, 44.8% indicated to a great extent. Figure 1 at g) on analytical thinking and innovation, none of the participants indicated to no extent, 7.4% indicated to some extent, 20.6% indicated to a moderate extent, 72.1% indicated to a great extent. Figure 1 at h) on creativity, originality and initiative, none of the participants indicated to no extent, 2.9% indicated to some extent, 18.8% indicated to a moderate extent, 78.3% indicated to a great extent. Figure 1 at i) on technology design and programming, none of the participants indicated to no extent, 13.2% indicated to some extent, 36.8 of the respondents indicated to a moderate extent, %50% indicated to a great extent. Figure 1 at j) on critical thinking and analysis, none of the participants indicated to no extent, 6% indicated to some extent, 16.4% indicated to a moderate extent, 77.6% indicated to a great extent. Figure 1 at k) on leadership and social influence, 1.5% of the participants indicated to no extent, 16.2% indicated to some extent, 25% indicated to a moderate extent, 57.4% indicated to a great extent. Figure 1 at l) on complex problem solving, none of the participants indicated to no extent, 4.4% indicated to some extent, 23.5% indicated to a moderate extent, 72.1% indicated to a great extent. Figure 1 at m) on emotional intelligence, 2.9% of the participants indicated to no extent, 10.1% indicated to some extent, 30.4% indicated to a moderate extent, 56.5% indicated to a great extent.

Analysis of aspects relevant to Higher Education curriculum considered to PRODUCE graduates ready to develop business innovation enabled the researcher to develop this study's Signification Framework PRODUCE element (cf Figure 1 illustrate that HEI should place more emphasis and consider creativity, originality and initiative, critical and analytical thinking, and complex problem-solving when formulating their programs. Further, Entrepreneurship should be another aspect considered by HEI when formulating their programs for producing graduates ready to develop business innovation. This discussion or interpretation is supported by participants that were interviewed, they of the opinion that universities should be able to train graduates on entrepreneurship to clearly understand the various dynamics around developing and running a business, innovation, and solution. Also, results from the interview coincided with the results of the questionnaire regarding entrepreneurship in the Higher Education curriculum.

Participant 3 indicated:

> *"Look, **I think definitely business skills,** you know, how do you run a business, so all the things that I've just mentioned, **putting in place the governance issues that will make your business run smoothly.** When I started working on my own, someone said to me, as **an entrepreneur, she said to me, you need to make time to work for your business, and you can't always work in your business".***

Participant 5 indicated:

> *"[…] to get the entrepreneur to do stuff for themselves, you know, sort of coming in, and getting a lecture on how to, on how to plan your company, […]. in closing, **the universities have the ability to say look, we need to cultivate entrepreneurship amongst our students, if a student is selling textbooks by the grass leave him alone. Because once you put a stop to it, it stifles entrepreneurship, if students sell sweets in the corridors of universities.** I mean, most of those students that actually do that, it's a, it's a survival mode…for them, you know, I mean".*

Participant 7 indicated:

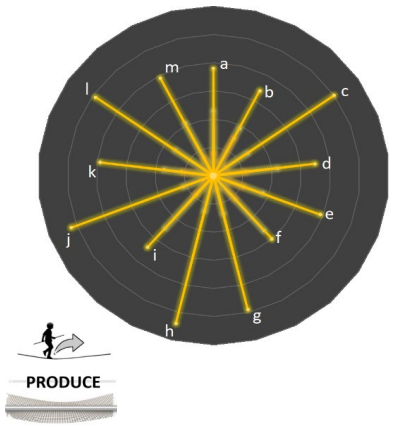
> *"[…] skills that the entrepreneur. So, it's being able to critically review your own solution, and seeing those shortfalls in the solution and then pivoting and coming up with an alternative.*

Participant 10 indicated:

> *"[…] **train entrepreneurs**. […] they must have an understanding [of] basic financial principle, strategic principles, marketing principles, business principles. That is the key thing, it's a holistic view. They need*

to know everything from how to form idea, the vision, mission, that strategic principles, they need to know how to sell it, which is marketing, they need to know how to drive the financial business and how to work out profit and loss and viability. And then obviously, yeah, that that for me is key. […] an entrepreneur must have leadership skills. An entrepreneur must understand how to communicate how to sell. They must know how the sales process they must know what behavioural [...]"

Next, Figure 2 demonstrates the PRODUCE intervention key; – looking at those aspects considered relevant in the HEI curriculum to ensure the readiness of graduates to develop business innovation. The area inside the polygon made by a to m points is a quantitative marker of the Produce Innovation so it can be further applied to other input data.



a) Strategic information management
b) Artificial intelligence
c) Entrepreneurship
d) Advanced business management
e) Systems analysis and evaluation
f) Big data and analytics
g) Analytical thinking and innovation
h) Creativity, originality, and initiative
i) Technology design and programming
j) Critical thinking and analysis
k) Leadership and social influence
l) Complex problem solving
m) Emotional intelligence

Figure 2: PRODUCE intervention key – Relevance of HEI curriculum (own source developed for this study, 2021)

Application 1: If HEI curriculum gives the highest priority to fostering creativity, originality, and initiative, but fails to include entrepreneurship, analytical thinking and innovation, critical thinking and analysis, and complex problem-solving in equal measure in all its teaching and learning activities, then the likelihood decreases of producing graduates that are able to develop business innovation. In this case, an intervention will be necessary, for example, programme review to align module outcomes.

Application 2: Although big data and analytics are relevant in the 4IR, it does not necessarily mean that its inclusion in the curriculum of an entrepreneurial university will **PRODUCE** the readiness of graduates to develop business innovation. An overemphasis on one aspect of the curriculum at the expense of other relevant aspects indicates that an intervention is needed.

Furthermore, it is noteworthy that artificial intelligence was rated the lowest, especially since the Fourth Industrial Revolution (4IR) is driven by artificial intelligence, as described by Mhlanga (2021), which has direct impacts on innovation and infrastructure development. AI seems to be the next big driver of change and will largely impact the industry and how innovation is harnessed, therefore the researcher thinks that AI should be considered significantly when HEI (re)formulates its programs.

5. Conclusion

There is a growing need for HEIs to develop graduates with an entrepreneurial mindset, innovative and capable of contributing to business innovation. This was addressed using a Signification Framework element **PRODUCE**, which produces an intervention key that addresses aspects considered relevant in the Higher Education curriculum to **PRODUCE** graduates ready to develop business innovation and entrepreneurship. The intervention key assists HEI through intervention benchmarks, to inform curriculum redesign. Based on the findings it is

important to note that aspects, such as creativity; originality and initiative; critical thinking and analysis; analytical thinking and innovation; complex problem solving; and entrepreneurship are relevant. Furthermore, it is noteworthy that based on the findings artificial intelligence was rated the lowest, this comes in specifically as 4IR is driven by artificial intelligence, as described by Mhlanga (2021), which has direct influence and largely depends on innovation and infrastructure development.

It is noteworthy to recognise that creativity; originality and initiative; critical thinking and analysis; analytical thinking and innovation; complex problem solving; and entrepreneurship should take precedence within HEI's curriculum to **PRODUCE** graduates ready and capable to develop business innovation and/or become entrepreneurs. This study allowed the researcher to understand which aspects are considered relevant for the HEI curriculum (to produce graduates with the capability to produce business innovation) and which they should consider when (re)formulating their programs.

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