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TITLE

A conceptual framework for adopting micro-credentials for skills development of South African entrepreneurs

by

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ABSTRACT

One of the main driving forces that fuels a business venture to be successful, is the skills of the entrepreneur and how the skills are applied into the business. Without adequate skills, entrepreneurs are bound to experience inevitable failure. This research study aims to address this issue by focusing on how micro-credentials (an emerging educational technology not yet widely explored in the context of entrepreneurial skills development) can be used by South African entrepreneurs for their skills development. The possession of core entrepreneurial skills and the knowledge to apply the skills effectively, has potential to steer entrepreneurs in the direction of success and sustainability. Fourteen interviews were conducted for this research study and findings showed that entrepreneurs recognise that there is a need for skills development and micro-credentials are capable of fulfilling that need. The collected data was analysed through the thematic analysis method, examined, and synthesised to produce a conceptual framework for micro-credential adoption.

Keywords: educational technology, entrepreneur, micro-credentials, digital badge, certification, skills development, competency enhancement.

1 INTRODUCTION

Educational technologies - known interchangeably as digital technologies to expedite learning, are classified as General Purpose Technologies (GPT) because they not only affect the economy, but all factors of life (Hernandez et al., 2016). One of the expectations from educational technologies in line with the concept of GPTs is that, educational technologies should promote entrepreneurship and simplify the process of creating products and services (Burdakova et al., 2019).

One of the reasons for entrepreneurial failures is the lack of adequate entrepreneurial skills (Zizile & Tendai, 2018). Thus, with the vast advantages provided by educational technologies, entrepreneurs should harness these technologies for their skills development (McGreal et al., 2022). This then begs the question, how do South African entrepreneurs take advantage of available educational technologies (and their many benefits) for skills development (Kruger & Steyn, 2021)? An emerging educational technology that can be utilised to develop the skills of entrepreneurs is micro-credentials. Generally defined as short verified courses, where successful candidates are presented with a digital certificate or a digital badge after the completion of the course (Rossiter & Tynan, 2019). Micro-credentials are fairly new and there has been little exploration of the technology in the entrepreneurial context. This paper aims to bring to light, the contribution micro-credentials can have in the pursuit of entrepreneurial skills development. This research aims to produce a conceptual framework that entrepreneurs can use to adopt micro-credentials in order to improve their entrepreneurial skills. The skills to be studied in this paper were identified by Kruger and Steyn (2021) in Figure 1 as the core competencies that entrepreneurs need to possess, to attain a competitive advantage in the business world. Namely, innovation skills, creativity, leadership, communication, networking, sales, business and technology skills.

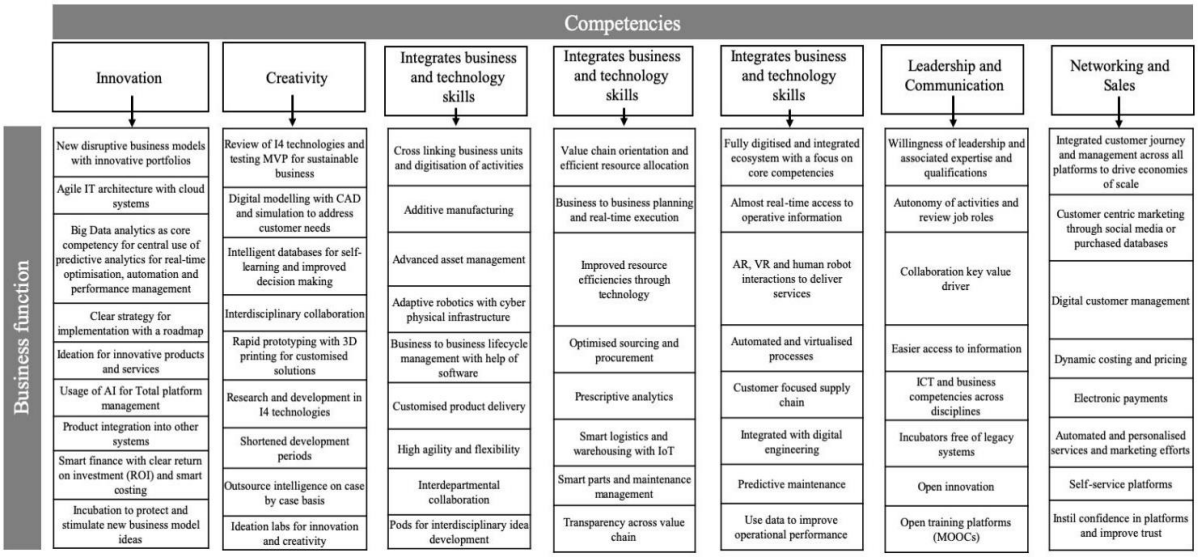

Figure 1: Core entrepreneurial skills

Source: (Kruger & Steyn, 2021)

Apart from the entrepreneurial skills mentioned in Figure 1, this research acknowledges that there are many more relevant entrepreneurial skills identified in existing literature, but for the purpose of this research, only the aforementioned are considered. This research paper aims to study the adoption of micro-credentials (and its sub-set concepts of nano learning and gamification) for skills development of entrepreneurs. It intends to determine how micro-credentials can lead to the development of skills as well as the betterment of existing entrepreneurial skills. The unit of observation is entrepreneurs in South Africa, particularly those in the Gauteng province. The findings of this research are synthesised, analysed, and visually presented in a conceptual framework.

1.1 BACKGROUND INFORMATION

Entrepreneurs are pivotal to every country's success – in both developed and developing countries. They are drivers of economic growth, social capital and employment creation in the countries they conduct their business in (Faggian et al., 2017). Many study leaders in this field have stressed the importance of entrepreneurship, indicated how fast paced the entrepreneurship environment is, due to it being fuelled by technology, and emphasised on the need for constant growth (Grivokostopoulou et al., 2019). Many of the study leaders advocate knowledge acquisition, skills acquisition and adapting to the ever-evolving

entrepreneurship business environment. This research focuses on South African entrepreneurs and how emerging educational technologies, particularly micro-credentials (nano learning and gamification) can be adopted and utilised to ensure that entrepreneurs are well equipped with adequate skills that are necessary for continual growth and success in an ever-changing technology landscape.

1.2 PURPOSE OF THE STUDY

The purpose of this research paper is to develop a conceptual framework that South African entrepreneurs can use to adopt micro-credentials for their skills development. The educational sector is gradually accepting micro-credentials as an alternative to traditional qualifications (Ahmat et al., 2021), but the business environment is still warming up to the introduction of this educational technology. Learners who adopt micro-credentials benefit in numerous ways – for less cost than traditional qualifications, they can personalise their learning journey and tailor it to their career needs and this increases their employability (McGreal et al., 2022), likewise, entrepreneurs can also benefit from micro-credential adoption. This research aims to bring to light the opportunities afforded by micro-credentials for the business environment, and ultimately assist entrepreneurs with the adoption of this educational technology for the purpose of skills development.

1.3 PROBLEM STATEMENT

Micro-credentials are an emerging educational technology which is being escalated mainly because of the Covid-19 pandemic (Wheelahan & Moodie, 2021). This new approach of learning and skills acquisition is currently being explored in the educational sector as an alternative post-secondary study route (Selvaratnam & Sankey, 2021), where the aim is to allow students to learn new skills through shorter courses instead of the longer traditional route of acquiring a university degree to improve their employability (Lim et al., 2018). Nonetheless, there is a need to explore micro-credentials in the context of entrepreneurial skills development. There has been very little research done on micro-credentials and their potential contribution to entrepreneurial skills development.

Many people are slowly realising that micro-credentials are a good alternative to university or college qualifications which are typically delivered through in-contact lessons (which was not completely possible for some time, due to governmental restrictions on gatherings

in response to Covid-19 (Nkosikhona et al., 2022). Micro-credentials are also being gradually adopted in the workplace as a means for continual skills improvement, however, they are not being widely propagated in the entrepreneurial environment (Hills & Hughes, 2016). This is due to many potential reasons, such as: (1) some entrepreneurs do not know about digital badges; (2) some entrepreneurs have heard about digital badges but do not know what to look for in a badge as an entrepreneur seeking to improve their skills; (3) some entrepreneurs are late adopters or laggards because they are sceptical of digital badges and still prefer the traditional way of learning; (4) some entrepreneurs do not realise the importance of continual skills development; (5) some entrepreneurs do not have the technological skills or infrastructure required to adopt micro-credentials (Naudé, 2018). This research paper intends to explore that gap and produce a conceptual framework on the adoption of micro-credentials for skills development of South African entrepreneurs.

1.4 RESEARCH QUESTIONS

Main question: What are the constructs of a conceptual framework for adopting micro-credentials for skills development of South African entrepreneurs?

Sub-questions:

1. Which core skills should South African entrepreneurs possess to remain sustainable in their businesses?
2. What is the Information and Communications Technology (ICT) profile that entrepreneurs should have to adopt micro-credentials?
3. What are the barriers towards micro-credential adoption?
4. What are the essential characteristics of a micro-credential ecosystem for entrepreneurial skills development?

Research Objectives:

1. To identify the constructs of a conceptual framework for adopting micro-credentials for skills development of South African entrepreneurs.
2. To establish the core skills that South African entrepreneurs should possess to remain sustainable in their businesses.
3. To determine the ICT profile required for entrepreneurs to adopt micro-credentials.

4. To determine the barriers towards micro-credential adoption.
5. To determine the essential characteristics of a micro-credential ecosystem for entrepreneurial skills development.

1.5 ASSUMPTIONS

1. That most if not all entrepreneurs in South Africa want to acquire new entrepreneurial skills and also enhance the skills they already possess in order to become sustainable in their businesses.
2. That entrepreneurs know there is a need for continual skills development.
3. That there are micro-credentials which are readily accessible to entrepreneurs in South Africa.
4. That many businesses fail because the entrepreneurs who own and manage these businesses lack adequate entrepreneurial skills.

1.6 LIMITATIONS

1. This paper will not study all available educational technologies, it will only focus on one among many educational technologies – micro-credentials.
2. This paper will not study all core entrepreneurial skills, but a carefully selected set of core entrepreneurial skills based on existing literature.
3. This research paper will only look at the South African context.

1.7 CONTRIBUTION

This research paper aims to produce a conceptual framework for the adoption of micro-credentials for entrepreneurial skills development of South African entrepreneurs. The conceptual framework is designed with a focus on micro-credentials and the core skills needed by entrepreneurs to attain success and sustainability in their businesses. This framework should be able to guide entrepreneurs on what to look for in a micro-credential program when considering upskilling themselves. All elements of this research will be applied with the goal of producing the aforementioned contribution.

1.8 BRIEF CHAPTER OVERVIEW

Chapter one introduces the focus and purpose of this paper, it provides background information of this research, gives insight into the purpose of the study and the problem

being explored, furthermore, the research questions to guide this research, assumptions in the field of study, details about the contribution to be made, as well as the limitations that this paper is constrained to.

Chapter two focuses on the literature review, where secondary literature on micro-credentials and its contribution to entrepreneurial skills development is reviewed. The chapter gives insight into the importance of entrepreneurial skills development according to literature, the various educational technologies that entrepreneurs can use to upskill themselves. Micro-credentials are then introduced and discussed in detail along with concepts of gamification and nano-learning. The chapter then focuses on opportunities and challenges of micro-credential adoption and the discussion concludes with the theoretical framework section.

Chapter three provides details about the methodology applied in this research paper. This chapter follows the structure outlined in Saunders' research onion, where the research philosophy is discussed, then the approach followed in the study is stipulated, the methodological choice applied, the strategy followed in the study as well as the time horizons considered. The chapter then provides insight into the data collection method and information on how the data analysis is conducted. Lastly, the ethical considerations are discussed.

Chapter four focuses on the analysis of findings from the data collected. The interview participants are firstly introduced, then their responses to the interview questions in Appendix A are presented and analysed. A conceptual framework is then developed and explained in detail.

Chapter five concludes with the summary of findings, a discussion about the contributions made by this study, points for future research are outlined, and lastly the concluding remarks are provided.

1.9 CONCLUSION

This chapter provided details about the background information of this research paper, the purpose of the study, and the identified problem. The research questions that will guide this paper were stipulated, along with the assumptions and limitations of this research.

Lastly, the contribution that this research aims to make was discussed, and an overview of each chapter was provided.

2 LITERATURE REVIEW

2.1 INTRODUCTION

There is currently limited peer-reviewed literature in the dynamic field of micro-credentials (MCs) (Selvaratnam & Sankey, 2021) especially in the context of entrepreneurial skills development. However, this paper intends to explore the existing body of research that investigates micro-credentials and their ability to assist entrepreneurs in upskilling themselves. This literature review follows the following structure: the importance of entrepreneurial skills development is discussed, then educational technologies and their known benefits are discussed, following that, micro-credentials are defined, and a general understanding of micro-credential characteristics, opportunities and challenges is established. The generic flow of the micro-credential ecosystem is then discussed before delving into micro-credentials in the context of entrepreneurial skills development. Lastly, the theoretical framework and considerations underpinning this research are discussed.

2.2 ENTREPRENEURIAL SKILLS DEVELOPMENT

Governments recognise that entrepreneurship is a source of employment and economic growth of the country (Din et al., 2016), stressing on the importance thereof. However, South Africa has low entrepreneurial activity compared to other sub-Saharan African countries due to a low percentage of potential and established entrepreneurs who have adequate entrepreneurial skills to sustain a business venture (Herrington & Coduras, 2019). The failure rate of small and medium enterprises in South Africa is quite high, and one of the main reasons is the lack of adequate entrepreneurial skills (Fatoki, 2018). Al-Abri et al. (2018) also agree with the fact that South African small and medium entrepreneurs lack the necessary skills needed to be successful and sustainable in their business ventures. The success and sustainability of a business venture depends on core skills of the entrepreneur (RezaeiZadeh et al., 2017), therefore, entrepreneurs should focus on improving their entrepreneurial skills in order to boost the performance of their business ventures (Barazandeh et al., 2015). It is indisputable that developing the skills of entrepreneurs is an important issue, and most study leaders in the entrepreneurship field agree that entrepreneurial skills can be taught through experience and training (Kyndt & Baert, 2015). Entrepreneurial skills can be defined as knowledge, attitudes, and skills that enable an entrepreneur to create and sustain a successful business venture (Jardim,

2021) or simply, the ability to demonstrate knowledge through action (Ibrahim & Mas'ud, 2016).

Some of the core entrepreneurial skills that help entrepreneurs to cater for various customer preferences, adapt to environmental and technological changes, are namely, business management skills, marketing, financial skills and human resource skills (Kerrin et al., 2017). According to Schneider et al. (2017), necessary entrepreneurial skills for success are, managerial skills, risk management skills, innovation skills and skills to effectively manage competition. Kruger & Steyn (2021) mention that innovation skills, creativity, business and technology skills, leadership and communication, as well as networking and sales skills are necessary for entrepreneurial success. Ismail & Zain (2015) identifies marketing skills, creativity, flexibility, leadership, organisation, planning and financial management skills as core entrepreneurial skills needed for success. It is evident that researchers' descriptions of the core entrepreneurial skills needed by entrepreneurs might vary depending on the industry of entrepreneurs' business ventures, and the approach taken by the researcher (Kyndt & Baert, 2015), however, the main concern remains, that entrepreneurs should prioritise their skills development (Ibrahim & Mas'ud, 2016) regardless of the industry they operate in, and one way entrepreneurs can upskill themselves is through the use of educational technologies (Burdakova et al., 2019).

2.3 EDUCATIONAL TECHNOLOGIES

Educational technologies play a significant role in fostering entrepreneurial skills development by providing innovative tools, resources, and platforms that facilitate learning, collaboration, and practical experience (Chen et al., 2021). The adoption of emerging technologies has resulted in a digital revolution which has undeniably led to constant changes in the business world (Nkosikhona et al., 2022). Among these technologies are educational technologies, which are propellers of entrepreneurial activity (Darwish et al., 2020). They have been predicted to lead to increased innovation and increased entrepreneurial activity, and ultimately, to more sales and improved standards of living (Rippa & Secundo, 2019). Educational technologies assist entrepreneurs to identify trends in the market as well as easily identify and satisfy customers, suppliers, and employees (Weaven et al., 2021).

Examples of educational technologies that aid entrepreneurial skills development:

Educational technologies such as artificial intelligence are known to be useful to entrepreneurs as a means to transfer data into knowledge which supports decision making in businesses (Kruger & Steyn, 2021). Online Courses and Massive Open Online Courses (MOOCs) are platforms that offer a various selection of courses on entrepreneurship (Chen et al., 2021), and these platforms can be used by entrepreneurs to acquire necessary skills. Online courses provide flexibility, which allows entrepreneurs to learn at their own pace and customise their learning experience according to their needs (Brauer, 2023). Educational technologies often integrate elements such as quizzes, simulations, and gamification, in order to improve learner engagement and promote active participation (Kinshuk et al., 2013). These elements improve problem-solving skills, critical thinking, and decision-making skills - essential qualities for entrepreneurs (Kerrin et al., 2017). Virtual reality (VR) and augmented reality (AR) technologies provide a space where entrepreneurs can practice real-life scenarios and apply learnings to their businesses. These technologies mimic real-world experiences and challenges people to think critically (Pinchuk et al., 2019). VR and AR platforms provide entrepreneurs adequate room to experiment with business scenarios, create strategies, make business decisions, and observe the outcomes without fear of real financial risks. These simulations help entrepreneurs to improve their adaptability skills, strategic planning, and financial skills (Abed et al., 2015).

Educational technologies also support remote teamwork, which allows entrepreneurs in various locations to collaborate on business projects, collectively solve problems while also sharing ideas (Antonaci et al., 2015). These collaborative tools mimic entrepreneurial ventures which are collaborative in nature and help entrepreneurs to develop their communication skills as they collaborate, and enhance their ability to work in a team (RezaeiZadeh et al., 2017). Educational technologies also help entrepreneurs to enhance their data analysis skills to make informed business decisions. These skills are necessary for entrepreneurs when conducting market research, identifying trends in the market, and understanding the needs of customers (Darwish et al., 2020). As technology becomes increasingly pivotal to business operations (Akdil et al., 2018), it is important to understand various educational technology concepts, as they have the ability to offer opportunities for entrepreneurs to learn how to build and manage technology driven business ventures (Naudé, 2018). Some educational technologies offer virtual acceleration programs, which

guides entrepreneurs through the process of developing their business ventures (Rippa & Secundo, 2019). These programs are known to enhance performance of businesses in various ways (Mamula & Ćoso, 2015). Social media platforms can also be seen as an educational technology, they have the ability to connect aspiring entrepreneurs with industry experts from whom they can draw knowledge. Engaging in these communities helps entrepreneurs to develop their networking skills (Foroudi et al., 2017). Other educational technologies can teach entrepreneurs data analysis and business intelligence skills which empowers entrepreneurs to make data-driven decisions, to optimise their business operations by improving the quality of their product offering, reducing costs, improving efficiency of operations and reducing market related risk (Dubey et al., 2020).

The emergence of recent educational technologies such as micro-credentials has led to many research questions at the intersection of educational technologies and entrepreneurship that beg for attention on educational technologies and their particular characteristics in moulding entrepreneurial pursuits (Rippa & Secundo, 2019). Entrepreneurs contribute largely to sustainable development and their performance is closely linked to their skills, knowledge, and strategy agility (Biclesanu & Dima, 2021), it is therefore important they are equipped with the necessary resources they need to keep their skills up to standard to ensure success and sustainability in their operations (Nkosikhona et al., 2022). The adoption of micro-credentials has the potential to empower entrepreneurs to improve their entrepreneurial skills which in turn ensures they reach their full potential (Rashid, 2019) in the constantly evolving business world. Overall, educational technologies provide a dynamic and accessible environment for individuals to acquire the skills necessary for entrepreneurial success. These technologies not only offer knowledge but also encourage practical application and experiential learning, which are crucial aspects of developing entrepreneurial skills.

2.4 DEFINING MICRO-CREDENTIALS

Micro-credentials (MCs) are an emerging educational technology, thus, there is no common agreed definition as yet (Wheelahan & Moodie, 2021), for the purposes of this research, micro-credentials are understood as a method to recognise skills, knowledge, experience, and competencies without requiring an individual to complete a conventional university degree or diploma (Nkosikhona et al., 2022). MCs are more specialised and typically offered as short verified cources presented online or in-person, for individuals to

acquire knowledge and skills in a particular subject area (Yieng & Haron, 2023). They include stackable certificates, certifications, and digital badges (Houyi et al., 2022). The introduction of micro-credentials has been accelerated by the Covid-19 pandemic and it is already being explored by researchers in the context of higher education as a means to increase employability (Ghasia et al., 2019).

Micro-credentials are also defined as a certification of assessed learning or a manner of short learning experiences which are complementary to a formal qualification (Brown et al., 2021). Another way they can be defined is that they are shorter learning interventions that focus on assessing and validating that a specific skill has been acquired (McGreal et al., 2022). MCs are gradually being accepted as a good alternative to traditional qualifications which are being critised for their high cost, lack of alignment with employment needs as well as their inability to adapt to changing trends since they are structured in an inflexible manner (Brown et al., 2021). MCs are cheaper and more flexible in comparison to traditial degrees, they also arguably provide more work readiness, making them a more promising option (Boud & Jorre, 2021).

The credibility of micro-credentials is one of the reasons why some people hesitate the adoption of this technology (Fishman et al., 2018) as it often relies on their alignment with industry needs and standards. Collaborations between micro-credential providers and industry experts can enhance the relevance and validity of the skills being taught (Ahmat et al., 2021). The concept of stackable credentials allow entrepreneurs to accumulate a series of MCs over time (Brauer, 2023), which leads to a more comprehensive qualification, and this ultimately contributes to the credibility of the entrepreneur's skill set. It is undeniable that MCs propel entrepreneurial skills development by offering a flexible, efficient, and targeted way for entrepreneurs to acquire the specific skills they need for success in their ventures (Yieng & Haron, 2023).

As the business world continually evolves, micro-credentials are proving to be a good tool for continuous learning and entrepreneurial skills development through the following ways: micro-credentials are modular in design, which allow entrepreneurs to select the skills they need to enhance (Brauer, 2023). This flexibility is essential for entrepreneurs, as they can customise their learning journey to their specific skills needs and personal goals (Ahmat et al., 2021). There are MCs that focus on specific skills or competencies relevant to

entrepreneurship (Staker et al., 2020), such as business planning, market research, financial management, marketing, human resource, and innovation skills (Kerrin et al., 2017). This targeted approach ensures that entrepreneurs acquire practical skills that are relevant to their business needs (McGreal et al., 2022). Micro-credentials allow for rapid skill acquisition because entrepreneurs need to continually acquire new skills to be equipped to respond to immediate difficulties in their business ventures (Nkosikhona et al., 2022). It allows entrepreneurs to acquire necessary knowledge and skills quickly, without having to commit to longer traditional qualifications. In terms of micro-credential recognition, micro-credentials are typically offered by reputable educational institutions, organisations, or platforms (Selvaratnam & Sankey, 2021). As a result, acquiring a micro-credential or digital badge demonstrates to potential investors, business partners, and customers, that an entrepreneur has acquired knowledge and skills from a recognised source (Hunt et al., 2020).

Entrepreneurship is a dynamic field with ever-evolving challenges and opportunities (Kerrin et al., 2017). Micro-credentials encourage a culture of continuous learning and upskilling, enabling entrepreneurs to stay updated with the latest trends, technologies, and strategies (Kruger & Steyn, 2021). Many micro-credential programs are designed to be stackable, meaning that learners can earn multiple credentials and combine them to achieve a broader qualification (Willis et al., 2016). This allows entrepreneurs to build a comprehensive skill set over time. MCs often include practical assignments, case studies, and projects that encourage learners to apply their knowledge in real-world scenarios (Rossiter & Tynan, 2019). This hands-on experience is crucial for developing problem-solving and decision-making skills relevant to entrepreneurship (Costin et al., 2018).

MCs can be delivered through various formats, including online courses, workshops, webinars, and interactive modules (Nkosikhona et al., 2022). This flexibility accommodates the busy schedules of entrepreneurs and allows them to learn at their own pace. MCs are typically more cost-effective than traditional degree programs (McGreal et al., 2022). This affordability makes it easier for entrepreneurs to invest in their skill development without a significant financial burden. The credentials are often offered online, making them accessible to individuals around the world (Brown et al., 2021). This global reach enables entrepreneurs from diverse backgrounds to access good quality entrepreneurial education. Micro-credential programs often include opportunities for networking, connecting learners

with peers, mentors, and industry professionals (Houyi et al., 2022). Networking is a crucial aspect of entrepreneurship (Özcan, 2010), and these connections can lead to partnerships, collaborations, and valuable insights.

2.4.1 Characteristics of Micro-credentials:

Micro-credentials cater to individuals seeking specific competencies for career advancement, personal growth, and adaptation to changing industries (Hotaling & Sumeren, 2022). Some characteristics of micro-credentials include being concentrated, being modular and stackable (Brauer, 2023), therefore, they are quite effective in developing specialised skills in niche areas that may not be covered comprehensively in traditional degree programs. Micro-credentials are typically shorter in duration, and are flexible (McGreal et al., 2022), they have the ability to be applied practically, they have an assessment of competencies, recognition and relevance to industry needs (Houyi et al., 2022), they support lifelong learning, and professional development (Selvaratnam & Sankey, 2021).

2.4.2 The micro-credential ecosystem

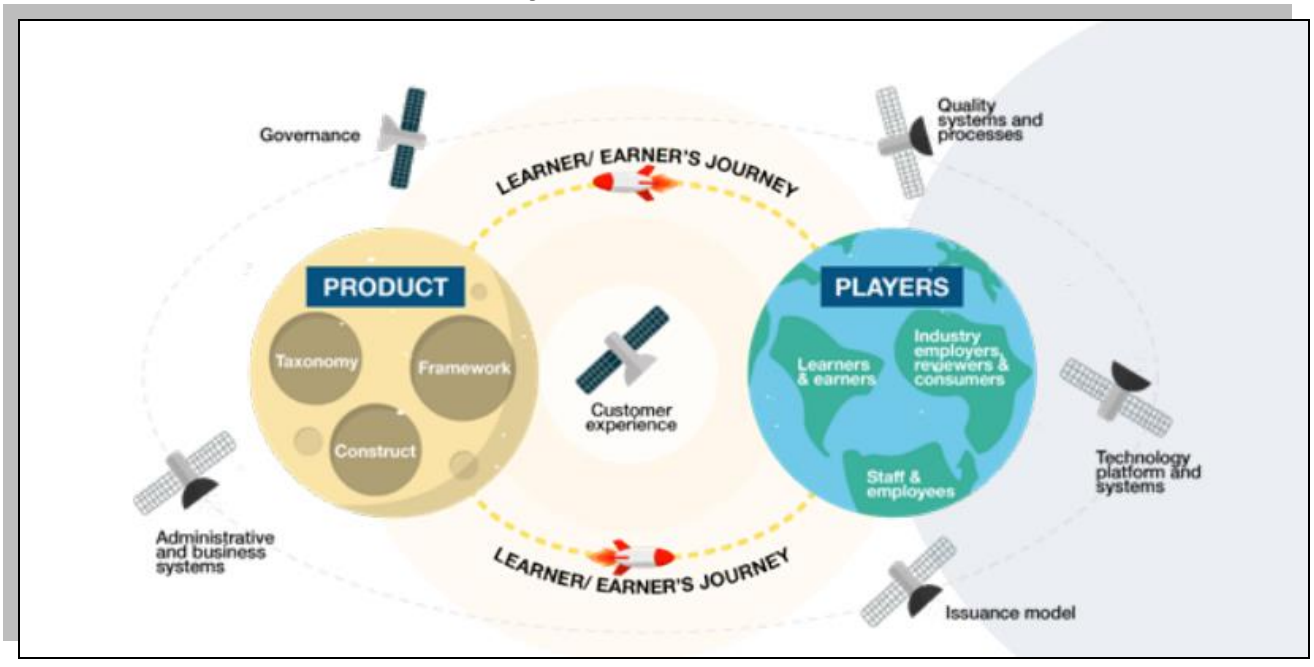

Figure 2: The micro-credential ecosystem

Source: (Rossiter & Tynan, 2019)

The micro-credential ecosystem dipicted in Figure 2 forms part of the fundamental structure followed before undertaking a micro-credential initiative (Elliott et al., 2014). This ecosystem is made up of various facets but at its core are the following key elements:

- The players: the individuals acquiring the micro-credential, the assessers of the micro-credential, issuing body, industry partners and employers.
- The product: the constructs of the micro-credential structure, schedule of the micro-credential, mode of instruction, and framework detailing the relationship between individual micro-credentials (Berry, 2017).

The micro-credential ecosystem thrives on its interconnectiveness (Ahmat et al., 2021), therefore, its other elements that should also be considered are customer and learner experience, technological platforms and systems, quality systems and processes, governance, policies and procedures, administrative and business systems, issuance models, and general business rules to be followed when creating and implementing a micro-credential solution (Rossiter & Tynan, 2019). The micro-credential ecosystem can be used to create micro-credentials that are designed to address key entrepreneurial skills (Ahmat et al., 2021) such as business planning, marketing, financial management, and innovation (Kruger & Steyn, 2021). Studies have shown that individuals who engage with micro-credentials exhibit improved mastery of these skills compared to traditional learning methods (Boud & Jorre, 2021). Micro-credentials allow entrepreneurs to learn on-demand, enabling them to acquire necessary skills precisely when they are needed. This approach can result in more efficient skill acquisition and application.

2.5 GAMIFICATION AND NANO-LEARNING AS METHODS OF MICRO-CREDENTIAL LEARNING

In the context of micro-credential learning, gamification and nano-learning are brilliant methods that improve learner engagement, and effectiveness in skill acquisition (Bagheri et al., 2019). These methods provide entrepreneurs with efficient learning experiences which are dynamic and flexible (Sánchez-Mena & Martí-Parreño, 2017). Gamification and nano-learning contribute to micro-credential learning in the following ways:

Gamification:

Gamification can be described as innovative applications that combine instruction and game play and are usually hosted on the web (Lämsä et al., 2018). It allows entrepreneurs to personalise their learning experiences and learn various concepts through the 'learning by doing' approach (Sánchez-Mena & Martí-Parreño, 2017). It enables entrepreneurs to easily understand concepts that may be difficult to grasp when explained in words (Antonaci et al., 2015). Gamification applies game design elements to contexts such as entrepreneurial skills education, in order to keep learners engaged and motivated (Höhl, 2019). It includes rewards such as trophies, points, different levels, and badges which can motivate entrepreneurs to complete the game (Isabelle, 2020). The badges that are awarded to players can also be referred to as micro-credentials since they are an indication that the player has achieved a certain skill (Yieng & Haron, 2023). Gamification can be used to make the learning experience enjoyable and interactive (Henning et al., 2017). Entrepreneurs are likely to be well engaged and determined to complete the program because of the sense of achievement, the feeling of progression and competing with other players (Lämsä et al., 2018). Gamification encourages entrepreneurs to actively participate in the learning experience, through various challenges, simulations, and interactive scenarios. Entrepreneurs are encouraged to apply their knowledge and skills to solve business problems and achieve goals (Chen et al., 2021). Gamification platforms provide timely feedback on performance, allowing entrepreneurs to comprehend their strengths and identify areas which need improvement in real time (Wangi et al., 2018). It also incorporates features that encourage collaboration and interaction between players. Gamified micro-credential programs can mimic real-world scenarios where entrepreneurs can apply their knowledge and skills and enhance practical understanding (Mamula & Ćoso, 2015). The engaging nature of gamification can also enhance information retention, which increases the long-term effectiveness of the learning experience.

Nano-Learning:

Nano-learning, also known as micro-learning, involves delivering content in extremely short, focused portions (Khlaif & Salha, 2021). Nano-learning is typically described as a method of learning where the overall content is broken down into smaller, easily understandable content (Aburizaizah & Albaiz, 2021). It aligns well with micro-credential learning by providing learners with quick, targeted learning experiences (Job & Ogalo, 2012). Nano-learning is known to enhance learning, performance productivity, and support

skills development in various subjects including entrepreneurship (Zandbergs et al., 2021). It is another delivery method for micro-credentials because it can be used as an approach to deliver entrepreneurial content with the aim of enhancing entrepreneurial skills (Aburizaizah & Albaiz, 2021).

Nano-learning supports micro-credential programs by increasing learning efficiency as it breaks down content into bite-sized portions, which allow entrepreneurs as learners to acquire specific skills quickly without investing a lot of time (Skalka et al., 2021). It also gives entrepreneurs flexibility by allowing them to learn whenever they have time to spare (Job & Ogalo, 2012), making it easy to fit learning and training into their busy schedules. Another aspect of nano learning is its ability to focus on a single topic or skill (Henning et al., 2017), which ensures that entrepreneurs acquire necessary knowledge and skills without distractions. Nano-learning promotes continuous learning and entrepreneurial skill enhancement by offering short and regular learning experiences (Zandbergs et al., 2021). It accommodates different learning preferences by providing content in various formats (Aburizaizah & Albaiz, 2021), such as videos, infographics, quizzes, and short readings. It also improves entrepreneurs' information retention span because short, repeated learning stays longer in an individual's memory (Job & Ogalo, 2012). Nano-learning is also easily accessible on mobile devices (Chen et al., 2021), which enables entrepreneurs to access content anytime they have the opportunity. Gamification and nano-learning can therefore be considered effective delivery methods of micro-credentials which contribute to entrepreneurial skills development.

2.6 MICRO-CREDENTIALS AND ENTREPRENEURIAL SKILLS DEVELOPMENT

The entrepreneurship environment is considered a vehicle for economic growth and employment creation (Foroudi et al., 2017), with entrepreneurial skills development greatly desired by policy makers and practitioners, there is a growing agreement that some entrepreneurial skills can be taught (Lackéus & Middleton, 2015). Micro-credentials are currently mainly explored as an alternative to traditional higher education and as a faster way to increase employability and help individuals to be more markatable for various job opportunities (Boud & Jorre, 2021). However, there is a growing need for micro-credentials to be explored in the context of entrepreneurial skills development (Yieng & Haron, 2023). Educational technologies, micro-credentials included, contribute significantly to learning processes that result in skills acquisition (Qureshi et al., 2021) and can therefore be used

for the skills development of entrepreneurs. Micro-credentials can be said to have been introduced as a response to disruptive changes caused by the fourth industrial evolution (Ghasia et al., 2019) – such as increasing globalisation, increasing impact of artificial intelligence, technological advancements in the business world which introduced the risk of displacement (Brown et al., 2021). These changes highlighted the importance of upskilling and reskilling entrepreneurs to thrive in the ever changing digital world (Brauer, 2023). Micro-credentials are now being used to recognise the acquisition of core competencies and skill sets, and can thus be used by entrepreneurs to acquire and recognise necessary entrepreneurials skills (Fishman et al., 2018).

Entrepreneurs can use micro-credentials for entrepreneurial skill development by first determining which entrepreneurial skills they need to develop or enhance. Common skills include leadership, marketing, finance, innovation, and communication skills (Tang et al., 2020), then researching and choosing micro-credential programs that align with their skills development goals. Entrepreneurs can look for recognised and credible providers that offer micro-credentials in their chosen skill areas. The next step is to create a study plan for their skills development journey (Weaven et al., 2021), firstly, by deciding which micro-credentials to pursue, and how they fit into their overall entrepreneurial skills development goals. Entrepreneurs then enroll in the selected micro-credential program and complete the learnings, assessments, or projects required (Hameed & Irfan, 2019). Micro-credential courses are often designed to be completed in short periods of time, ranging from a few weeks to a few months (Wheelahan & Moodie, 2021). Upon completion of the course, the next step is to take the knowledge and skills acquired into practice by applying them to real-world business challenges (Akhmetshin et al., 2019). As entrepreneurs earn micro-credentials, they can compile and stack them to show their expertise (Ahmat et al., 2021). This can be valuable when seeking funding for business ventures, partnerships, or other entrepreneurial opportunities. Micro-credential programs can be used as an opportunity to connect with industry professionals and enhance the entrepreneur's network (Ghasia et al., 2019). Networking can lead to potential insights and collaborations (Wulandari & Djastuti, 2017). Entrepreneurs should constantly keep refining and expanding their skill sets by pursuing additional micro-credentials as needed (Yieng & Haron, 2023). Entrepreneurial skills are diverse, and continuous learning is essential for success (Wulandari & Djastuti, 2017). Whether entrepreneurs are starting a new business, managing an existing venture, or exploring other innovative initiatives, they are

encouraged to apply their newly acquired skills to attain success in their entrepreneurial endeavors (Zandbergs et al., 2021).

2.7 OPPORTUNITIES AND CHALLENGES OF MICRO-CREDENTIAL ADOPTION

Micro-credentials are typically designed in a way that allows for short, structured, stakable modules (Nkosikhona et al., 2022). Their ability to provide personalised and flexible learning experiences make them a more desirable alternative to conventional learning methods (Rubleske & Cata, 2017). However, the opportunities and challenges involved cannot be ignored when considering the adoption of micro-credentials.

Opportunities of Micro-Credential Adoption:

Micro-credentials (MCs) allow entrepreneurs to focus on acquiring specific skills or competencies that are immediately applicable to their business ventures (Willis et al., 2016). MCs promote continuous learning (Hotaling & Sumeren, 2022) which is necessary for entrepreneurial success. Entrepreneurs can continually upskills themselves and improve their knowledge to stay relevant in a rapidly changing entrepreneurship environment (Boud & Jorre, 2021). Entrepreneurs can create personalised learning experiences and stack multiple micro-credentials (Selvaratnam & Sankey, 2021). This flexibility allows entrepreneurs to customise their skills development journey and ensure that it matches with their needs and aspirations. Micro-credentials offer a faster route to gaining new skills compared to traditional degree programs (McGreal et al., 2022). This is particularly valuable for entrepreneurs since they may need to upskill themselves quickly. Micro-credentials recognise learning from various sources, including online courses, workshops, as well as self-directed studies (Brauer, 2023). MCs also improve employability by demonstrating particular skills that employers value (Wheelahan & Moodie, 2022). MCs can be displayed on platforms such as LinkedIn, so that the accomplishments may be seen by potential investors (Del Vecchio et al., 2018) and are often designed in partnership with industry experts, to ensure that the learning content is recent and aligned with current industry needs (Hotaling & Sumeren, 2022). Micro-credentials are generally more affordable than traditional degree programs, making quality education easily accessible (Staker et al., 2020).

Challenges of Micro-Credential Adoption:

There is a large number of available micro-credential programs and this can cause confusion about which ones are truly valuable and credible (Ahmat et al., 2021). Ensuring the quality of micro-credential programs can be a challenge, especially when they are offered by various providers (Selvaratnam & Sankey, 2021). The lack of standardised criteria for developing and assessing micro-credentials hinders comparability between different programs (Chen et al., 2021). While the diffusion of micro-credentials expands, some individuals and institutions still prioritise traditional degrees and certifications (Maxwell et al., 2017). Because micro-credential programs are typically short, this might limit the depth of knowledge that can be acquired compared to longer more traditional educational experiences (McGreal et al., 2022). Access to technology and the internet is essential for pursuing micro-credentials, which can be a barrier for individuals with limited internet connectivity or digital literacy (Orrensalo & Nikou, 2021).

In summary, while micro-credentials offer numerous opportunities for targeted skill development and flexible learning, they also face challenges related to quality assurance, recognition, and standardisation (Acree, 2016). As the landscape continues to evolve, efforts to address these challenges will be important in ensuring the effective integration of micro-credentials into the entrepreneurship environment. According to the Mathematica Policy research (Maxwell et al., 2017), micro-credential adoption is likely to result in improving an individual's reponse to labour market needs and increase employability (Wheelahan & Moodie, 2022), result in the acquisition of skills and competencies that are in demand, allow individuals to stack credentials for career mobility. Micro-credentials are also typically less time consuming and less costly than traditional university degrees or diplomas (Elliott et al., 2014). On the contrary, the lack of a standardised structure and adequate understanding of what particular micro-credentials represent can make it difficult to identify or select a credential (Rossiter & Tynan, 2019). Micro-credentials can have uneven quality due to lack of quality standards (Kinshuk et al., 2013). Lack of oversight could lead to variability in the effectiveness of entrepreneurial skills development. Financial challenges can also reduce access to micro-credentials and ultimately deter the adoption thereof (Ahmat et al., 2021).

2.8 THEORETICAL FRAMEWORK

This research considers theories of diffusion of innovation and self-determination. The two theories are briefly discussed, compared and explored in the context of educational

technology adoption. These particular theories were chosen among many other information technology adoption theories because they are most relevant to this research. Key characteristics and constructs of both theories are used as a base for constructing a conceptual framework for micro-credential adoption for South African entrepreneurs.

Innovation diffusion theory (IDT): Rogers developed this theory (Momani & Jamous, 2017) and defines innovation as “an idea, practice, or object that is perceived as new by an individual or another unit of adoption” and diffusion is defined as “the process by which an innovation is communicated through certain channels over time among the members of a social system” (Sahin, 2006). This theory states that individuals decide to adopt an innovation or to reject it based on their beliefs about that particular innovation (Lee et al., 2011). IDT has been widely applied to various disciplines, including information technology. The main elements of the diffusion of innovation are the innovation, communication channels through which knowledge of the innovation is spread, time and social system (Momani & Jamous, 2017).

IDT comprises of five main characteristics of innovation namely:

- Relative advantage: the extent to which a new innovation is deemed better that the innovation it replaced.
- Comparability: the extent to which the innovation is consistent with potential users’ needs, values and experiences.
- Complexity: how hard or easily potential users understand the new innovation, as well as ease of use of the innovation. The less difficult it is to use an innovation, the more likely individuals are willing to accept it.
- Trialability: the extent to which the innovation can be tested.
- Observability: the extent to which the results of the innovation can be seen by other people. These five characteristics provide insight into individuals’ adoption of innovation and the decision making process (Atkin et al., 2018).

A study was conducted by Lee et al. (2011) on the relationship between usefulness of e-learning systems and people’s intention to use the e-learning systems. This study applied elements of the IDT model where they discovered that when people percieved that e-learning systems could meet their jobs need, they considered the innovation more useful than traditional learning methods (which supports the comparability characteristic). The

study then showed that when people found the innovation to be more useful, this increased their intention to use the innovation (which supports the relative advantage characteristic). Ease of use was another factor people took into consideration when deciding to use e-learning systems (which supports the complexity characteristic). It was concluded that relative advantage, comparability, and complexity, had a significant impact on people's intention of using e-learning systems (Lee et al., 2011). A similar study was conducted on SME's adoption of technology, the same constructs were applied and it was concluded that relative advantage, comparability, and complexity were part of the factors that had a significant impact on SMEs' intention of adopting technology (Ramayah et al., 2013). These same constructs are also considered when looking at micro-credential adoption for skills development and are discussed at the end of this section.

The IDT theory describes people's willingness to adopt innovations (Dearing & Cox, 2018) and typically comprises of five categories of people when it comes to adopting innovations; there are innovators, which are the venturous people who innovate; then there are early adopters, typically social leaders and the first to adopt innovations. Then the early majority who adopt innovations before the average members of society. The following group is the late majority, these people are more sceptical about new innovations and are usually very traditional. The last group are the laggards, these people are typically the last to adopt innovations because they often only adopt innovations after they have become tradition (Dearing & Cox, 2018).

The pandemic accelerated the growth of online learning, resulting in the gradual widespread of micro-credentials as they are typically offered online (Ahmat et al., 2021), allowing entrepreneurs ease of access and the flexibility to complete micro-credential programs from anywhere in the world. However, as some entrepreneurs adopt micro-credentials, others may be reluctant (Brauer, 2023). Some common barriers to the diffusion of micro-credentials are the credibility of the credentials and the standard unit of effort – the credit hour, which was originally designed simply to measure workload rather than student learning (Karlin et al., 2016). In response to the issue of credibility, quality assurance providers, often accrediting agencies, evaluate micro-credential programs against defined standards set by a third party. They check that the credentials comply with set standards and they demonstrate to credential seekers that the credentials have met the objective standards (Maxwell et al., 2017).

Self-determination theory (SDT): it is a theory of motivation which can be described as the energy to take an action (Sørebø et al., 2009). SDT states that individuals typically have the desire to improve themselves, but this desire is negatively or positively affected by their social environment. This theory was developed by Deci and Ryan (Jeno et al., 2019), and it provides insight into three universal human needs namely, the need for autonomy, competency and relatedness (Jeno et al., 2019). Autonomy refers to the desire that individuals have, to freely regulate and control their own behaviour. Relatedness refers to the desire that individuals have, to feel connected with others, and competency refers to the desire that individuals have to be effective and sufficient when performing a task. SDT is a theory of human motivation (Ryan & Deci, 2017), constituting of extrinsic motivation, intrinsic motivation and amotivation, which has an effect on learning, personal experience, engagement and performance (Tyack & Mekler, 2020).

Extrinsic motivation is a type of motivation where the reason to perform an action is for a particular benenfit or because of pressure from other people. Extrinsically motivated individuals may perform an action in order to receive a reward, or to avoid shame, or to improve personal importance (Sørebø et al., 2009). On the contrary, intrinsic motivation is self-determined and more focused on inherent satisfaction (Oudeyer et al., 2016) and on activities which are perceived as genuinely interesting and enjoyable. Intrinsic motivation is the desired motivation for learning or training because it is associated with productive learning, improved well being and better performance (Kusurkar, 2012). Lastly, amotivation describes an absence of motivation, where individuals are no longer aware of the reason for performing a particular activity (Tyack & Mekler, 2020), so they may perform actions without knowing why they are performing those actions. These types of motivation are not permanent, but can change depending on circumstances. SDT states that the satisfaction of the aforementioned three human needs (need for autonomy, competence, and relatedness), lead to increased levels of intrinsic motivation (Jeno et al., 2019).

- Autonomy: refers to the need individuals have to be in control of their own behaviour. Micro-credentials are flexible and thus allow individuals to be in control of their learning experiences by giving them the freedom to tailor their learning to their needs and preferences.
- Relatedness: refers to the need to be associated with others. Micro-credentials are collaborative in nature, allowing individuals to share information and work together.

- Competency: refers to the need to feel proficient and effective in completing tasks that provide value. Engaging in micro-credential courses can lead to an increase in skills that individuals can use to complete value adding tasks in order to satisfy the competency need (Jeno et al., 2019).

Autonomy, competency and relatedness influence individuals' attitude towards adoption of innovations such as educational technologies. They play a key role in building individuals' intention to use educational technologies. A study conducted by Sørebø et al. (2009) focusing on technology adoption and its use in the workplace based on the SDT model, uncovered that extrinsic and intrinsic motivation are key drivers of people's intension to use a technology. Furthermore, Goldman et al. (2017) show that when individuals perceive themselves as having autonomy (control over their actions and behaviours), this increases their intrinsic motivation to perform an action, and when individuals feel that they are competent at something, that increases their intrinsic motivation, and lastly, when individuals are able to connect with others, this also increases their intrinsic motivation. Another study by Rosenkranz et al. (2015) focusing on medical students shows that the lack of fulfillment of the autonomy need, competency and relatedness need, leads to lack of motivation and often leaves individuals discouraged to carry out training or learning outcomes. These same constructs are also considered when looking at micro-credential adoption for skills development.

It is therefore important for entrepreneurs to be intrinsically motivated when adopting micro-credentials. Goldman et al. (2017) asserts that individuals who are intrinsically motivated attain more academic achievement, greater retention rates and are able to satisfy their desire for self-improvement in comparison to extrinsically or amotivated individuals. Micro-credentials have the ability to satisfy the three human needs stipulated by the SDT model. They have the potential to increase intrinsic motivation and assist entrepreneurs to self-improve by developing their entrepreneurial skills. However, because most micro-credentials are very flexible in nature, allowing entrepreneurs to choose when and where to complete the learning outcomes, this means that entrepreneurs have to regulate their motivation and be careful of procrastination (Pelikan et al., 2021).

IDT and SDT are both useful theories in the context of micro-credential adoption. Relevant constructs chosen from the IDT theory (complexity, comparability and relative advantage)

lead to an increase in the intention to adopt micro-credentials. On the other hand, constructs selected from the SDT theory (the need for autonomy, relatedness and competency) when satisfied, lead to an increase in extrinsic and intrinsic motivation which drives individuals to fulfil a certain action, in this case, the decision to adopt micro-credentials. These constructs were chosen by considering previous studies mentioned above (focusing on technology adoption) which applied the IDT and SDT theories. The constructs that surfaced consistently throughout multiple studies were selected to be applied to this study as well. The chosen constructs are displayed in Table 1, where each theory and its corresponding constructs which were chosen, along with a description, are stipulated. The relevance of the chosen constructs is briefly explained following Table 1.

Theory	**Construct**	**Description**
IDT	Comparability	When entrepreneurs perceive that micro-credentials meet their skills needs, this increases their intention to adopt micro-credentials.
	Complexity	When entrepreneurs perceive micro-credentials as easily accessible and easy to use, this increases their intention to adopt micro-credentials.
	Relative Advantage	When entrepreneurs perceive micro-credentials as a better alternative compared to traditional qualifications especially for skills development, this increases their intention to adopt micro-credentials.
SDT	Autonomy	When entrepreneurs have the freedom to select which micro-credential course best suits them, and they have the choice to go through the content at the time of their choosing, this satisfies the need for autonomy and increases the

		intention to adopt micro-credentials.
	Relatedness	When entrepreneurs are able to collaborate during the micro-credential course and learn through teamwork, this increases their intention to adopt micro-credentials.
	Competency	When entrepreneurs have the ability to successfully and effectively complete a task, this increases their intention to adopt micro-credentials.

Table 1: Relevant Constructs

This research will utilise the premises of the self-determination theory and the diffusion of innovation theory to support the adoption of micro-credentials for the upskilling of entrepreneurs, to improve performance and ensure that entrepreneurs are successful and sustainable in their business ventures. The key characteristics and relevant constructs chosen from the IDT and SDT theories are used as building blocks to design a conceptual framework for micro-credential adoption. Some of the chosen constructs were used to create the interview questions that were used for the data collection and are discussed later is section 4.1. As discussed in section 2.2, entrepreneurial skills have a direct impact on the success of a business venture, stressing the importance of identifying the skills which are necessary for success, in order for entrepreneurs to upskill themselves. Section 2.2 also describes the various skills necessary for entrepreneurial success and for the purpose of this research, core skills identified by Kruger and Steyn (2021) namely, innovation skills, creativity, business and technology skills, leadership and communication, as well as networking and sales skills, also form part of the conceptual framework developed in section 4, as they are key to successful business ventures.

Proposed theoretical framework

Figure 3 depicts the proposed theoretical framework created from the constructs stipulated in Table 1. The constructs are derived from the innovation diffusion theory and the self-determination theory as previously discussed. These theories have not yet been widely applied in micro-credential research in the context of entrepreneurial skills development.

The chosen constructs are however, aligned with the concept of micro-credential adoption, and if consistent with the primary data collected and analysed in Section 4.1, the constructs will be used as building blocks for the final conceptual framework. Figure 3 displays the characteristics of the IDT and SDT theories and how they contribute to micro-credential adoption. The adoption of micro-credentials by entrepreneurs with the intention to upskill themselves, leads to entrepreneurial skills development, where entrepreneurs are able to improve their core skills (business management skills, leadership skills, innovation, communication, networking, technological and creativity skills) as identified by Kruger and Steyn (2021). The development of these core entrepreneurial skills, ultimately results in business success and sustainability.

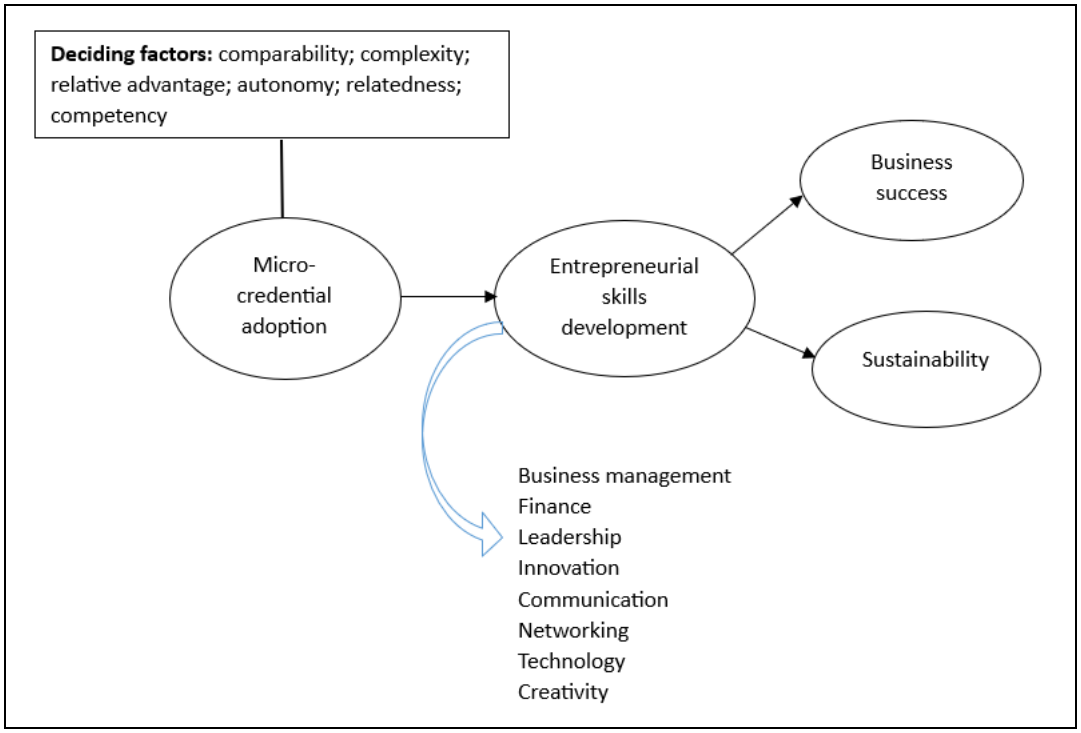

Figure 3: Micro-credential adoption

2.9 CONCLUSION

Educational technologies provide a way for entrepreneurs to improve or acquire the necessary entrepreneurial skills needed for them to succeed in their businesses. This research focuses on the adoption of micro-credentials as they have the potential to assist entrepreneurs in their skills development journey. The self-determination and diffusion of innovation theories are applied as a theoretical framework to guide this research.

3 METHODOLOGY

3.1 INTRODUCTION

The structure of this chapter is based on Saunders' research onion, where the research design consists of the research philosophy, approach followed in the research, methodological choice, research strategy, time horizons, techniques and procedures (Sahay, 2016). Lastly, the ethical considerations of this research are discussed.

3.2 RESEARCH DESIGN

3.2.1 Research philosophy

It is important for this research paper to consider the entrepreneur's views and the factors that shape their learning experiences and social realities. Interpretivism allows for that, since it aims to understand the phenomena of interest through the participants' eyes, and that is befitting for this research because the goal is to benefit entrepreneurs as they are the subjects of this research. Interpretivism is subjective, since it believes that individuals perceive things differently (Oates et al., 2022), likewise, entrepreneurial skills development is arguably a subjective topic because it is a concept that is influenced by personal views and experiences.

This paper applied an interpretivism approach, where the conceptual framework was designed using some building blocks which were identified from the views and opinions of participants of the research data collection. Interpretivism was the chosen research paradigm for this research paper because this paradigm looks at different aspects that contribute to social reality (Melnikovas, 2018). It acknowledges that there is not one reality, but multiple, because it depends on individual views, and individuals perceive situations differently and thus have different realities (Oates et al., 2022).

Not all entrepreneurs are the same, they have different views, beliefs, cultures, and they certainly have different needs in terms of entrepreneurial skills, and they can each satisfy their needs through different experiences and at different paces. This research aims to understand the relationship between micro-credentials and entrepreneurial skills development through interpretivism, it aims to study patterns and to develop a framework based on the understanding acquired from the research.

3.2.2 Approach

This research followed an inductive approach, where themes and meanings were generated from observing the data that was collected. The themes and meanings from observations were used to identify patterns and relationships to build a theory and reach a conclusion (Melnikovas, 2018). When applying the inductive approach, typically the researcher uses research questions to collect data through methods such as interviews. The researcher then identifies patterns which can be used to develop a theory (Liu, 2016). Likewise in this research, the researcher applied the same approach to develop a conceptual framework for the adoption of micro-credentials for entrepreneurial skills development. The framework was created based on chosen constructs from theories identified from literature as described in the theoretical framework section, in addition to the key themes identified from the data that was collected and analysed.

3.2.3 Methodological choice

This research followed the mono-method approach, as it focused solely on a qualitative research method (Melnikovas, 2018). Although the mono-method research is often weak in providing comprehensive solutions to social problems (Ojebode et al., 2018), this research aimed to be thorough by interviewing two groups of participants, to ensure that saturation point is reached in order to get optimal results which are credible and reliable. The first group of participants consisted of seven entrepreneurs operating in South Africa, who have acquired micro-credentials already, and the second group of participants consisted of seven entrepreneurs operating in South Africa, who have not yet acquired micro-credentials. This allowed the researcher to understand how the two groups of entrepreneurs perceive micro-credentials and skills development. It also allowed the researcher to gain more insight and information that was useful in developing the final conceptual framework for micro-credential adoption.

3.2.4 Strategy

The research strategy used was in-depth interviews. The interviews were used to gather all necessary information needed to facilitate this research. A target of 14 interviews were collected from small business entrepreneurs operating in Gauteng, South Africa. These 14 interviews were collectively used to draw insights and produce a conceptual framework that entrepreneurs can use for the adoption of micro-credentials, with the goal of

developing core skills required by entrepreneurs to be successful and sustainable in their businesses. The interview questions were created based on key factors identified from the innovation diffusion theory and self-determination theory discussed previously. The interview questions were semi-structured, which allowed participants to share their thoughts and views freely and unrestrictedly during the interview, and ultimately provide the researcher an opportunity to truly understand how entrepreneurs view micro-credentials for skills development.

3.2.5 Time horizons

This research was cross-sectional as this approach allowed the researcher to deal with the identified problem in less time and to collect data within a short period (Sahay, 2016). Due to time constraints on this research, a short-term time horizon was applied to ensure that data was collected promptly, and the research completed within the stipulated time frame for this study program. The goal was to collect all required data and complete all 14 interviews within three months, this was dependant on availability of entrepreneurs, as most of them were usually available on weekends as compared to weekdays. The interviews lasted for a duration of approximately 30 minutes. Following the data collection, the analysis of the data, findings and conclusions were drawn in a reasonably short period of time.

3.3 DATA COLLECTION

This section of chapter three provides details about the techniques and procedures that were applied for the data collection of this research paper.

3.3.1 Data collection method

In-depth interviews (online based or in-person, based on availability and preference of interviewees) were used to collect primary data. The interviews were guided by open-ended questions, to allow the researcher to understand the participants' views on the study of interest, and it also allowed factors, issues and sub-themes that were unidentified to be brought to light. Participants were able to freely answer provided questions in as much detail as possible. The questions were semi-structured to avoid swaying from the topic of interest. Interviews were chosen because this research required the researcher to engage with the subjects of interest to understand their views on entrepreneurial skills

development through educational technologies such as micro-credentials. The semi-structured approach with predefined questions ensured that the information acquired from participants was relevant, accurate, reliable and of good quality, and also left room for flexibility in cases where elaboration or follow-ups could be needed.

Contact information about entrepreneurs needed for this research was mainly acquired from entrepreneurs' websites, LinkedIn profiles, and from entrepreneurs themselves, especially where the entrepreneur did not have an online presence. For the selection process, the researcher identified a number of entrepreneurs operating in South Africa. Since two groups of entrepreneurs were required, the researcher asked the entrepreneurs whether they had any exposure to micro-credentials or not. This way, the researcher was able to select seven participants with micro-credentials and seven participants without micro-credentials. 8 out of 14 participants were identified from the researcher's networking circles, where various entrepreneurs from various industries exist. The rest of the participants were identified through the snowballing technique, where the initial participants assist in identifying other participants from their networking circles. Interviews were conducted mainly via Google Meets or WhatsApp as some participants requested, because they felt more comfortable using WhatsApp in comparison to other platforms. The correspondence between the interviewer and the interviewees was recorded provided the respondents' consent was granted. The recordings of the interviews were done through the ActivePresenter tool, and all recordings were saved and stored safely on Google Drive, where access to the recording will be given only to authorised personnel.

3.4 DATA ANALYSIS

A thematic data analysis method was applied to this study and the NVivo tool was used during the process. This method required the researcher to firstly understand the set of data collected through in-depth interviews (Brown & Stockman, 2013), then move on to identifying patterns and meaning within the data. This allowed the researcher to be able to derive new insights from the collected data and draw conclusions. A thematic analysis consists of the following six phases: familiarising yourself with the data; generating initial codes (which was done through NVivo); searching for themes; reviewing themes, defining and naming themes; lastly, producing a report (Javadi & Zarea, 2016).

Phase 1: familiarising yourself with the data. This is necessary to get a complete understanding of the data collected before analysing the data. In this study, phase one

was done by transcribing the interviews that were recorded onto MS Word, then reading the data repeatedly to become familiar with all aspects of the data. Through the repetitive reading, common patterns and potential themes began to emerge. These patterns were noted down as initial ideas.

Phase 2: generating initial codes. This phase is done by creating a complete list of ideas, then grouping these ideas into codes. The initial codes emerge from the raw data, so they are not refined, but are a sufficient indication of important patterns identified from the data. Table 2 below, is an example of how the initial codes were generated (entrepreneur 4 (Ent 4) was used as an example). The initial codes were very descriptive and low level. Each interviewee was coded with a phrase that captures the meaning from the transcribed data as seen in the example below:

	Phase 2
Transcription	**Initial Code**
Ent 4: “You definitely need a strong internet connection. And then I'd say also like a dedicated workspace is also important so that you can like focus on completing the course. So definitely, um, internet, a laptop, a dedicated workspace, but some courses would also require textbooks […] so I'd say a little budget for software tools, and you also need to know how to use the software tools”. “Accessing micro-credentials is generally straightforward, I'd say. The one that I'm doing specifically is very straightforward and easy to do. It's accessible, easily accessible. And I also think they do that because obviously the course is offered to a global, to a global audience. So, it's not just	Ent 4: you need a strong internet connection to complete a micro-credential course. Ent 4: you also need a dedicated workspace. Ent 4: you need a laptop as well. Ent 4: you need textbooks. Ent 4: you need a budget to access software tools for the micro-credential course. Ent 4: you need to know how to use the software tools. Ent 4: access to micro-credentials is easy. Ent 4: completing micro-credential courses is not difficult. Ent 4: micro-credential courses are easily available at a global level. Ent 4: short courses focus on various skills such as leadership skills, management,

for South Africans. Um, so, I think that's why they do make it very accessible and straightforward to access. It's quite easy." "…Short courses focus on leadership and management skills. So, through this, entrepreneurs can develop skills in leadership. Um, collaboration, communication, team building, um, and also skills like decision making. Um, with regards to entrepreneurs, it's really easy to be working and completing the course at the same time simultaneously, I'd say, um, because it's self-paced".	collaboration, communication, team building, decision making. Ent 4: micro-credential courses are self-paced and flexible.

Table 2: Transcription and Phase 2

Phase 3: searching for themes. The themes are generated from the initial codes which are stipulated in phase two, by grouping the initial codes into meaningful sets. Some initial codes form the main themes and others form the sub-themes; some codes can be combined to form a meaningful theme. The initial relationship between generated themes and sub-themes was also determined and can be reviewed in more detail in Figure 4.

Phase 4: reviewing themes. This phase focuses on ensuring that the identified themes and sub-themes relate to each other in a meaningful way. Another important factor to be considered is that the themes should be unique – it has to be easily understandable how the themes differ from each other. The themes also need to form a consistent pattern from phase one through to the fourth phase. Table 3 below shows the themes which emerged in phase 3 and how they were refined in phase 4. The phrases from phase 3 were refined into high level terms in phase 4, the researcher ensured that the terms capture the essence of the phrase from phase 3.

Initial themes	**Refined themes**
Phase 3	**Phase 4**

Ent 4: entrepreneurs need a strong internet connection, and a dedicated workspace	Pre-requisites
Ent 4: entrepreneurs need digital literacy skills to know how to use the software tools required to acquire micro-credentials	IT profile
Ent 4: micro-credentials allow for ease of access and ease of use	Complexity
Ent 4: a budget for some resources is required	Affordability
Ent 4: entrepreneurs can improve core entrepreneurial skills through micro-credentials	Comparability

Table 3: Initial themes and Refined themes

Phase 5: Defining and naming the themes. This phase is about analysing the data from all the preceding phases and defining the final themes. This phase is about interpreting the data content, naming the themes, and corresponding sub-themes, showing how themes and sub-themes relate to each other. This phase is also about summarising the scope of each theme into concise, accurate and understandable theme names. Figure 4 below, provides a detailed view of all the themes and sub-themes identified during the thematic analysis. In blue are the main themes and the corresponding sub-themes are bordered in green. In green we have sub-themes and the related patterns; these patterns provide more information so that the overall structure of the themes can be easily understood.

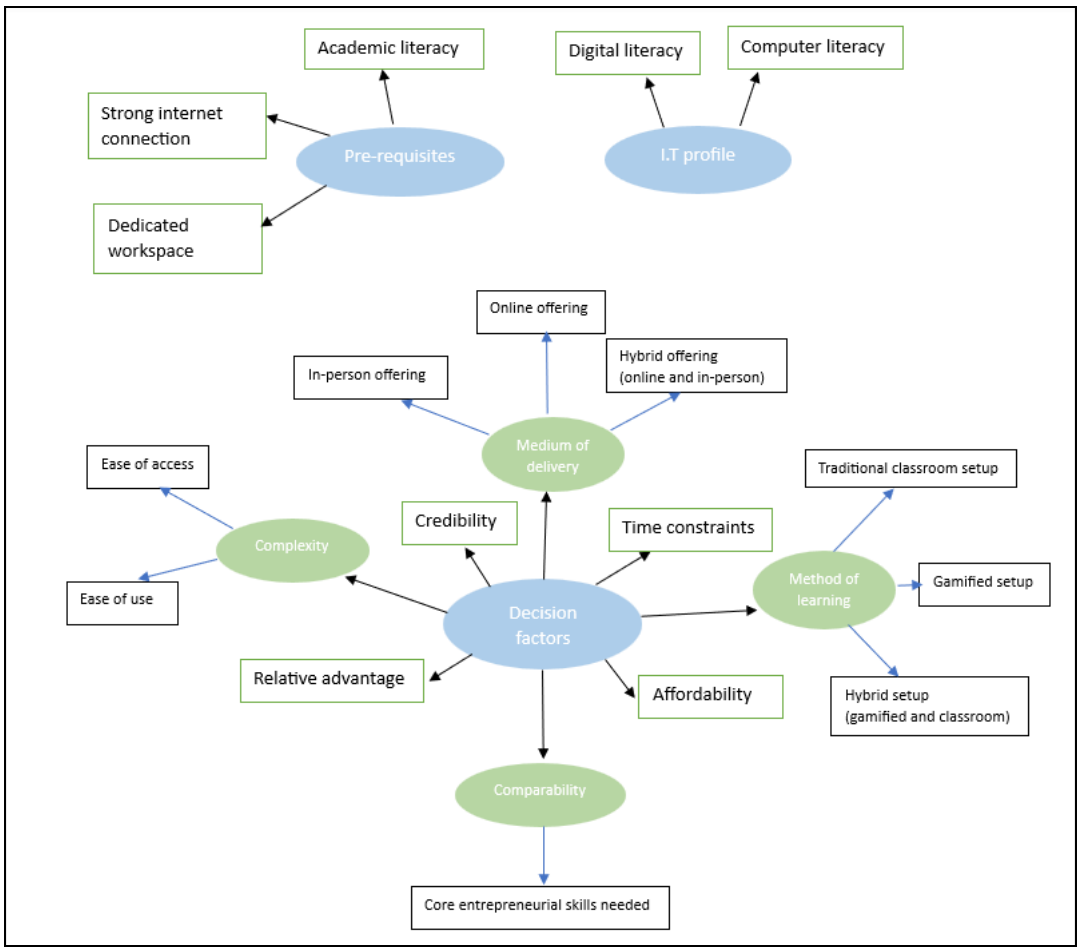

Figure 4: Refined themes

Phase 6: producing a report. This is the last phase, where a report can be created with all the identified themes, sub-themes and supporting data. The report should express the themes in an accurate manner, consistency should be visible, the themes should also be expressed in a logical manner while avoiding duplication. The themes generated during the thematic analysis formed the building blocks for the conceptual framework developed in chapter 4.

3.5 ETHICS

The researcher acquired an ethical clearance from the institution of study – The University of Pretoria, before commencing with the data collection. In addition to the ethical clearance, participants of the data collection phase provided written consent to be interviewed and to answer any questions before the commencement of the data collection process. Participants were assured that interviews will be conducted in good faith and information they will provide to the researcher will be stored safely and their privacy will be

respected. Information provided by participants was not used for any other purposes but for the sole purpose of facilitating this research. When all 14 participants were identified and selected, they received a letter of informed consent, which stipulates the purpose of the research, and information on how the privacy and confidentiality of participants is respected. Participants were requested to sign this form, indicating that they give their consent to be interviewed before the interviews commenced.

3.6 CONCLUSION

This research applied the interpretivism research paradigm and made use of in-depth interviews to acquire information which was necessary for the completion of this research from participants. The target sample size was 14 participants separated in two groups. A maximum of 14 participants were interviewed for this research, with the first group of seven participants comprising of entrepreneurs with micro-credentials and the second group of seven participants comprising of entrepreneurs without micro-credentials. The data collection methods and data analysis methods are also stipulated in this section, as well as the ethical considerations applied when data was collected from participants.

4 ANALYSIS OF FINDINGS

4.1 INTRODUCTION

This section provides information on the data collected from the interviews conducted. Each interview question and the respective response is discussed, analysed, and tied back to literature. A total of 19 questions are discussed – these questions can be found in Appendix A. The responses are grouped into two groups, responses from group A (where participants have micro-credentials) and responses from group B (where participants do not have micro-credentials at present). All interviewees were owners of businesses from various industries.

Introduction of interviewees

The section provides details about each of the interviewees who participated in the interviews. A brief description of their background is provided, as well as their view on micro-credentials. The 14 interviewees below make up the two groups of participants, where group A is made up of entrepreneurs with micro-credentials and group B is made up of entrepreneurs without micro-credentials.

Group A:

Entrepreneur 1: The entrepreneur is a young woman with a digital marketing business. She helps businesses to improve their online presence and reach their target audience. She has 3 employees that assist her when she gets projects to work on, so her presence is paramount since she directs and leads the rest of the team. She has been operating in this industry for about 3 years now and hopes to continue to grow her business until it reaches a point where the business can operate without her having to be very involved. She has acquired micro-credentials in order to gain more understanding of the digital marketing space and is currently applying the skills she acquired.

Entrepreneur 2: The entrepreneur is an elderly man with a business that focuses on supplying components, spare parts, and maintenance of equipment in the mining industry. This business was founded in 2019 and is growing rapidly due to the demand in South Africa. The entrepreneur believes that entrepreneurship education is of key importance in fostering knowledgeable and skilled entrepreneurs. He has acquired micro-credentials which he credits for some of his skills and knowledge. He believes that micro-credentials

are capable of equipping entrepreneurs with some of the “most valuable” skills that they need in their businesses.

Entrepreneur 3: The entrepreneur is an elderly woman with a business that provides ride hailing services. She owns a fleet of vehicles and has employed drivers who transport people within the Gauteng province in South Africa. She attests that managing her business has required her to acquire micro-credentials in order to increase her “business management skills, people management skills, communication, and finance skills”. She stated that she did not know about micro-credentials until a year ago when a fellow entrepreneur introduced them to her. She stated that other entrepreneurs may also not know about micro-credentials and their potential benefits, so the diffusion of the knowledge about micro-credentials needs to be accelerated, so as to reach a wider audience and help entrepreneurs.

Entrepreneur 4: The entrepreneur is a young woman with a sewing business. She and her business partner sew clothes for events such as weddings, birthdays, matric farewell parties, engagements etc. The business has many clients and has built a good reputation. The entrepreneur stated that she had to acquire micro-credentials which focus on sewing as this is not what her degree focus was on. She has a degree in Information Technology but has a passion for fashion. Instead of enrolling in a 3-year course to study fashion, she opted to enrol in short courses which award you a digital badge upon completion. She stated that acquiring micro-credentials allowed her to acquire the skills she needed in a much shorter time period and for an affordable price. As fashion continues to advance and new trends are introduced, she believes “it is important for entrepreneurs to continuously improve their skills” in order to remain relevant in their industries.

Entrepreneur 5: The entrepreneur is a young woman with a business focusing on event planning and catering. The business is well established and has a good reputation about the services they offer. The entrepreneur stated that she was surprised to discover that there are micro-credentials on various knowledge areas. She has acquired micro-credentials on event planning and the skills she acquired have helped her establish her business and make her mark in the industry. She believes micro-credentials to be a valuable method for entrepreneurs to upskill themselves in any knowledge area relevant to them.

Entrepreneur 6: The entrepreneur is a young man with a photography business. The business which started as an initiative to make extra pocket money for a tertiary student, has experienced rapid growth over the span of three years. The business has grown from only having photoshoots for students and other small projects, to photoshoots of big events and collaborations with major brands. The entrepreneur stated that he has always had a desire to be an entrepreneur and is very happy with the growth and profitability of his business. He has expanded the business and employed other photographers to assist him at big events such as weddings, concerts, large corporate events etc. He acquired micro-credentials to better his photography skills and finance skills.

Entrepreneur 7: The entrepreneur is a young man who also has a photography business. Since the business is still in its infancy, the entrepreneur is focused on acquiring as much skills as he possibly can so that he becomes a good photographer. He also stated that he is currently taking a short course on digital and social media marketing in an effort to improve his business' online presence and to attract more customers. He considers micro-credentials to be "a flexible and fast way of learning",

Group B:

Entrepreneur 8: The entrepreneur is a middle-aged woman with a business in the clothing retail industry. She owns a store where she and her employees (which comprise of her family members as this is a family business) sell thrifted clothing. The business is currently not as profitable as desired by the owner, so she is seeking for ways to make her business successful. She acknowledges that the lack of skills is indeed one of the reasons why the business is not as profitable, therefore, she would like to improve her entrepreneurial skills that will help her to attain business success. She is aware of micro-credentials but has not yet acquired any. Due to the crisis her business is facing, she is now considering completing short courses to acquire skills that are necessary to make her business profitable.

Entrepreneur 9: The entrepreneur is an elderly man with a business in the mechanical engineering industry. The business focus is on designing, developing, and maintaining various machinery and equipment, such as heating and cooling systems, engines, equipment for manufacturing plants, etc. The business is well established and has been

operational for over a decade. The employee count is also more than the other 8 entrepreneurs previously introduced. The approach the entrepreneur takes in his business operations is more seasoned compared to businesses that have been operational for a shorter period. The entrepreneur considers micro-credentials to be valuable, especially in his industry. He stated that individuals with micro-credentials have a specific skillset that may be required for a certain role, employing such an individual sometimes proves to be more beneficial and affordable compared to employing a university graduate whose degree is very generic. He stated that in his industry, “hands-on experience is a requirement, but when coupled with the right skills, individuals are bound to excel” and be productive, which is beneficial for the business.

Entrepreneur 10: The entrepreneur is entrepreneur nine’s business partner. They work together, fulfilling different roles to ensure the profitability of their business. Entrepreneur nine possesses the technical knowledge required to complete projects and entrepreneur 10 possesses the sales and marketing skills. He stated that for his function, it is paramount to have the knowledge and skills because the business relies on him to attract most of the clients. He stated that to fulfil his position he has applied his knowledge and experience which he has gained over the years. He has not had the opportunity to acquire micro-credentials, but he is aware that they are available and can be used to upskill entrepreneurs.

Entrepreneur 11: The entrepreneur is a young woman with a business that makes and sells natural hair products. The business has been in operation since 2018 but has experienced a slow growth to date. The entrepreneur stated that a lot of time needs to be invested in the business in order for it to be successful and profitable. As a busy woman trying to create more than one source of income, she finds herself with less time to focus on skills development, which she acknowledges to be of paramount importance for entrepreneurs. She has not acquired micro-credentials yet but is considering them as an alternative to traditional learning, in an effort to increase her entrepreneurial skills and apply them in her hair business.

Entrepreneur 12: The entrepreneur is a middle-aged man with a business that focuses on teaching children between the ages of 7 and 12 how to programme. The business has experienced a demand for their services which led to the hiring of tutors because the

owner could no longer tutor all the students on his own. The entrepreneur is a firm believer that entrepreneurial skills are vital for business success. He acquired a university degree where he learnt how to code in various programming languages and has since used those skills to educate his students. He stated that although he has good programming skills, the IT environment is constantly changing, with newer versions of programming languages being introduced. This emphasises the importance of upskilling and reskilling in the IT industry.

Entrepreneur 13: The entrepreneur is an elderly woman who owns a bakery business. The business started over a decade ago as a hobby but has now grown significantly. The entrepreneur considers passion and hard work to being of key importance for the success of a business, especially in her industry. She has not acquired micro-credentials but is aware of their availability and believes that any tool that is capable of improving an entrepreneur's skills should be shared among entrepreneurs so that they are aware of what is available to them.

Entrepreneur 14: The entrepreneur is an elderly woman with a business that offers art and pottery classes. The business is established and has been operational for seven years. The business has a loyal customer base that religiously take art and pottery classes as a way of improving their mental health – shifting their focus from the hectic demands of everyday life. The entrepreneur has not acquired micro-credentials, but her academy offers credentials to individuals that complete certain levels of the art and pottery training. She stated that she does this to encourage students (since she also teaches children from ages six upwards), as well as for them to have proof that they mastered a certain skill.

Interview questions and summarised responses

What are the technological skills that entrepreneurs need to acquire micro-credentials?

Group A: Entrepreneurs need digital literacy skills to be able to complete a micro-credential course. That means the ability to comfortably use electronic gadgets such as computers, laptops, smartphones, and tablets because micro-credential courses can be done through various gadgets. Entrepreneurs also need basic academic literacy skills to

understand the course content and complete the program successfully. They also need basic skills to navigate through course content on the learning management tool that their chosen institution uses.

Group B: Entrepreneurs need computer literacy skills to be able to complete a micro-credential course. They also need to know how to navigate their way around the course content especially if it is offered online so that they can easily review the course content.

According to the feedback acquired, entrepreneurs need basic digital literacy skills to use electronic gadgets and navigate through course content. They also need basic academic literacy skills. Micro-credentials are an educational technology which can be accessed through various technological devices (Elliott et al., 2014), thus entrepreneurs need technological skills to acquire micro-credentials. Micro-credentials can be offered in a traditional classroom setup or online (McGreal et al., 2022), and if entrepreneurs opt for online learning, then basic technological skills are necessary.

How much time and effort does it take to acquire a micro-credential?

Group A: It depends on the set duration of the chosen micro-credential course. Some programs should be completed within a set period, typically ranging from a few weeks to about six months (some take as long as up to a year). Self-paced programs are more flexible, which allows individuals to complete the program within the period they set for themselves and to invest as much effort as they are willing to. Some interviewees stated the below in response to the question above:

“I am actually doing another micro-credential program in social media marketing …it can take up to 6 months if the course is instructor led and in person, like the one I did last year at UCT in English language teaching. The one I’m currently completing is self-paced but can be completed in 8 to 10 weeks” – Entrepreneur 5.

“The time and effort required really depend on the size of the content. Another thing is if a course says it should be completed in 100 hours, depending on the difficulty level, it might take you less or more time to complete the content depending on how fast you grasp the

concepts being taught, so it really depends on the course and the time and effort a person is willing to invest" - Entrepreneur 1.

Group B: Typically, not a lot of time and effort is required. The micro-credential courses are usually short and can be done in a few months, however, the required duration and efforts mainly depend on the micro-credential course which is chosen, as well as the course content, more course content means more time and effort needed to go through the material and likewise, less course content means less time and effort required to complete the chosen course. Some interviewees stated the below in response to the question above:

"It depends on the course you choose to do, some courses from UCT are usually 4 to 8 weeks, or on Coursera, some courses need 2 weeks. So, where the courses are flexible and in-person classes are not required, if a person is really determined they can even complete the course in a much shorter time" – Entrepreneur 8.

"It shouldn't really take a lot of time, if you have the right resources and have chosen the right course for you. It won't take a lot of effort either, especially if you are motivated enough and know what you want to achieve" – Entrepreneur 9.

According to the feedback acquired, the time and effort required to complete a micro-credential course is mainly dependent on the selected program and course content. Studies support the responses acquired because they state that the duration and effort required is related to the course content and credits of the course (McGreal et al., 2022). However, micro-credentials aim to minimise time requirements by allowing individuals to complete the programs in less time compared to traditional qualifications (Ghasia et al., 2019). The courses are typically short and give individuals the freedom to decide how much time and effort they are willing to invest in completing the micro-credential program (Nkosikhona et al., 2022). This ties back to section 2.8, where the autonomy construct from the self-determination theory was discussed. Micro-credentials give entrepreneurs the freedom to choose when and how to complete their learning outcomes, which satisfies the need for autonomy because entrepreneurs are in control of their actions and therefore increases their intention to adopt micro-credentials.

What are the facilitating conditions needed to acquire micro-credentials?

Group A: some micro-credential courses are free, and some are offered at a cost, thus, entrepreneurs need to ensure they have a budget for the course fee where required. Entrepreneurs need time to focus on the course content and complete assessments. They need a stable internet connection, a conducive and dedicated workspace as well.

Group B: entrepreneurs are busy individuals, so time is a major constraint. They need to ensure that they set aside time to focus on training and completing the micro-credential course. Most of the courses require access to the internet so a stable internet connection is needed. Entrepreneurs should also be mindful of their location when thinking of micro-credential programs because location can affect internet connectivity.

The feedback acquired shows that entrepreneurs need time, money, stable internet connection and a conducive dedicated workspace in order to successfully complete micro-credential programs.

How easy is it to access a micro-credential course?

Group A: it is fairly easy to access micro-credentials as information about these programs is shared across various platforms such as LinkedIn, Instagram, Facebook etc. and also across internet search engines. Information about these programs is readily available, it is a matter of searching for what you need on platforms such as google.

Group B: it is easy if individuals are already aware of micro-credentials and their benefits. Lack of exposure can make it difficult for some entrepreneurs to access micro-credential courses although these programs are easily accessible.

From the feedback acquired, micro-credential courses are easily accessible and available, but some individuals may struggle to access the programs due to lack of exposure and knowledge about the programs and their benefits. Micro-credentials allow for ease of access (Job & Ogalo, 2012), as knowledge about micro-credentials is increasing and awareness is being raised on the various platforms that micro-credentials can be accessed from, such as Google, LinkedIn, platforms like digitalpromise.org and learningdesigned.org

(Hunt et al., 2020). The ease of access ties back to section 2.8 where the complexity construct from the innovation diffusion theory was discussed. Entrepreneurs perceive micro-credentials to be easy to access and use, therefore, this increases their intention to adopt micro-credentials because they do not perceive them as complex to acquire or difficult to find.

How does acquiring micro-credentials contribute to an entrepreneur's skills levels?

Group A: there are various micro-credential courses with a focus on various skills that entrepreneurs need to improve. Completing these programs equips entrepreneurs with key skills that they need to be successful, entrepreneurs just have to practice what they learn.

Group B: micro-credential courses on business management skills, financial skills, marketing skills etc. are available and can be used by entrepreneurs to acquire the necessary knowledge and skills. However, entrepreneurs need to ensure that they put their knowledge into practice in order to improve the skills they need to.

The feedback above shows that entrepreneurs can improve key entrepreneurial skills if they complete relevant micro-credential programs and put the knowledge and skills they acquire into practice. Entrepreneurs can improve their soft and hard skills through micro-credentials (Ghasia et al., 2019). As discussed in chapter 2, micro-credentials have the potential to resolve the skills gap entrepreneurs have, allowing them to improve core skills to better respond to the changing nature of the business environment (Brown et al., 2021).

How is training conducted within your organisation? In terms of the medium of delivery?

Group A: training is mainly conducted online, especially post the Covid pandemic where most things that were usually done in person are now done remotely. Much value is also achieved from online training because it allows individuals flexibility to complete some training in their preferred time, which reduces the pressure individuals have.

Group B: training is typically done in person, where knowledge is transferred from one person to another within the organisation. The option of online training is to be explored soon.

Most entrepreneurs now prefer training to be conducted online because it allows them the opportunity to decide when to focus on training among their busy schedules. Micro-credentials are available online (Nkosikhona et al., 2022), which gives entrepreneurs the flexibility they need. Some programs are offered in person, or through a hybrid approach which combines in person learning and online learning (Yieng & Haron, 2023).

Which skills do you aim to improve through micro-credentials?

Group A: mostly business management skills, leadership, financial management skills, marketing, communication, technological skills, and skills relevant to the entrepreneurs' business venture. Some interviewees stated the below in response to the question above:

"I'm working towards improving my technological skills as well as my creativity skills […] innovation skills as well […] in the digital marketing space, everything is done via some applications so I'm improving my technological skills, particularly so that I know how to use the applications in my space. I also need to be creative and to come up with new ideas when marketing people's businesses, so that I can advise them accordingly**"** – Entrepreneur 1.

"We need to improve basic financial management skills, because we sell our stock and make money, but that money needs to be managed well. We need some sales skills too, to know how to interact with customers, as well as basic business management skills in order to efficiently manage inventory and our business processes. We have a small number of employees, so we need some leadership skills, or rather HR skills to manage the team well**"** – Entrepreneur 2.

"The world is driven by technology now, so I'm actually doing a software engineering short course from ALX**"** – Entrepreneur 5.

“We really need to improve our financial skills, that’s the main one for us. Our drivers pay us weekly, so it is very important to management the flow of money in the business to avoid some money being unaccounted for since it comes in small chunks. Other skills we also need are communication skills, to improve the relationship we have with our drivers, and business management skills in general” – Entrepreneur 3.

Group B: mostly business management skills, financial management skills, marketing, communication, networking, and skills relevant to the entrepreneurs’ business ventures. Some interviewees stated the below in response to the question above:

“In our industry, things are now moving towards automation, so we need to improve our technological skills so that we can automate some of our processes. If we don’t upskill ourselves, we might find that we could become irrelevant in the industry as time goes on” – Entrepreneur 9.

“Definitely sales, I’m aiming to improve that skill, secondly, digital marketing or any kind of marketing skill, so that I can expose more people to my business and attract more high value customers to make more profit” – Entrepreneur 11.

Entrepreneurs generally want to improve the core skills that they need to be successful and sustainable in their businesses. Most of the aforementioned entrepreneurial skills were discussed in chapter 2 and pointed out as core skills needed by entrepreneurs to attain success. Examples of such skills are innovation skills, creativity skills, leadership skills, communication skills, networking skills, problem solving and decision making skills (Jardim, 2021). Kruger and Steyn (2021) also identified similar skills as being core skills required by entrepreneurs and these skills are aligned with the responses received from the interviewees.

Do you find value in acquiring micro-credentials instead of a traditional university degree? If so, why, or why not?

Group A: for entrepreneurs, it is more valuable to acquire micro-credentials as they are focused on specific skills that are relevant to the entrepreneur. Micro-credentials can be used to respond to immediate skills needs within an organisation in comparison to

traditional qualifications, which typically take longer to complete and cost more than micro-credential programs. Traditional qualifications are beneficial for individuals seeking employment, but not so beneficial for busy entrepreneurs.

Group B: although not having acquired micro-credentials yet, there is a belief that entrepreneurs stand to benefit from acquiring micro-credentials, because traditional degrees are typically very broad and not as flexible as micro-credential programs. Entrepreneurs have very busy schedules, and for small business entrepreneurs, this means time spent away from their businesses is time spent not making a profit, in that sense, it is not beneficial for entrepreneurs to commit to a traditional qualification which typically takes 3 years and may require in-person classes which means more time away from the business.

Entrepreneurs find value in acquiring micro-credentials in comparison to traditional qualifications. Traditional qualifications are being criticised for their lack of alignment with industry needs, inability to adapt to the ever-changing business environment and new trends (Brown et al., 2021). Entrepreneurs are leaning towards micro-credentials which are deemed to be flexible, personalised, and as providing individuals with on-demand skills which are necessary to adapt (Ahmat et al., 2021) in an evolving business environment. This ties back to section 2.8, where the relative advantage construct from the innovation diffusion theory was discussed. Entrepreneurs perceive micro-credentials as being a better alternative to traditional qualifications and therefore this increases their intention to adopt micro-credentials, as evident in the responses acquired.

How do you decide on which micro-credential to adopt?

Group A: the main factor is the skills needed, meaning which skills the entrepreneur aims to acquire or improve, that is the main deciding factor for most entrepreneurs. There are various micro-credentials available which can satisfy various skills needs of entrepreneurs. Other factors taken into consideration include affordability of the micro-credential program, credibility of the program and reputation of the offering institution, the time requirements as well as the medium of delivery.

Group B: the main factor is how much time is required to complete the micro-credential program, and how flexible the program is, so as to not affect business operations while focusing on training. Another factor is affordability of the program.

Entrepreneurs look at various factors when deciding which micro-credentials course to enroll in, namely: skills need, affordability, time requirements, flexibility of the program and its credibility. Entrepreneurs perceive micro-credentials as being able to satisfy their need for upskilling, this ties back to section 2.8 where the comparability construct from the innovation diffusion theory was discussed. Entrepreneurs perceive micro-credentials as being useful because they align with their need for skills development, this therefore increases entrepreneurs' intention to adopt micro-credentials.

How do you measure your skills levels?

Group A: years of experience and results. One can have experience and the required education, but for one to truly claim they have a particular skill, the result from applying that skill needs to be evident. This is important because results can be measured in various ways, through the growth of the business, an increase in profits, or a reduction of production costs through an introduction of efficient ways to conduct business operations.

Group B: depending on the years of experience the entrepreneur has in practicing a certain skill, as well as the productivity of the individual. If an individual is productive and effective in their tasks, that shows that the individual has a certain level of skills.

Entrepreneurs measure their skills depending on the years of experience they have in practicing a certain skill, as well as the output which result from their actions. This emphasises on the importance of putting to practice the skills acquired. To cater for the practicality requirement, micro-credentials combine theory and practice to provide effective programs (Chen et al., 2021) that are indeed capable of improving the skills of entrepreneurs. Entrepreneurs learn better through practice and reflection, so some programs involve experiential learning which allows entrepreneurs to mimic entrepreneurial behaviours and learn concepts practically (Costin et al., 2018).

How much flexibility do micro-credentials allow you in comparison to a traditional university or college degree?

Group A: micro-credentials are flexible in nature; they allow entrepreneurs to tailor their learning experiences and to decide when to complete assessments and go through course content. Unlike traditional qualifications, where the programs are structured in a rigid and inflexible manner. Because most micro-credentials are offered online, there is no need for entrepreneurs to attend classes in person, but traditional qualifications typically require individuals to attend in person classes and write in person examinations.

Group B: micro-credentials are more flexible because they allow entrepreneurs to choose the best time to focus on training, which allow entrepreneurs to balance their business operations and training programs.

Entrepreneurs agree that micro-credentials are more flexible in nature, in comparison to traditional qualifications. Proving to be more beneficial for entrepreneurs' busy schedules. Micro-credentials are flexible in nature, allowing students power to decide when and how to complete the programs (McGreal et al., 2022). Learning and training can be done from anywhere and at any time (Ghasia et al., 2019). Micro-credential programs are flexible in their design as well as in their delivery, making them a more convenient learning method (Ahmat et al., 2021) for entrepreneurs.

Would you say micro-credentials are as credible as qualifications acquired from universities and colleges? Why or why not?

Group A: the credibility of the micro-credential course depends on the institution offering the course as well as their reputation. Generally, micro-credentials from a reputable institution are as credible as qualifications acquired from a university or college and oftentimes, a better qualification than traditional ones.

Group B: some entrepreneurs hesitate to enrol in micro-credential courses due to questions around the credibility of the programs, but if the program is offered by a good institution with good standards, then the qualification is just as credible as traditional qualifications.

The credibility of micro-credential courses depends on the institutions offering the programs as well as the reputation of the institution. Willis et al. (2016) agree that the credibility and value of the micro-credential is dependent on the issuing body of that credential. Guidelines have been created on how micro-credentials should be developed to ensure credibility. The guidelines state that micro-credentials should be "outcome based, personalised, industry driven, on-demand and transparent" (Ahmat et al., 2021). To improve credibility, Fishman et al. (2018) furthermore states that micro-credentials should be designed to align with set curricula and admission standards.

Do micro-credentials accurately depict a person's skills levels, please justify your answer?

Group A: micro-credentials alone are not enough to justify an individual's skills level, but they do contribute. An entrepreneur can have micro-credentials which certify that they have particular skills and knowledge, but the knowledge and skills have to be put to practice so that the result of the skills are visible to all, making it easier to see the level of skills that entrepreneur possesses.

Group B: micro-credentials can be used to show that an entrepreneur has completed the training for a particular skill, but to say that the entrepreneur now has acquired a certain level of that skill cannot be accurately depicted through micro-credentials alone.

The responses acquired show that micro-credentials can be partially used to depict an entrepreneur's skills levels but are not enough on their own to accurately depict an entrepreneur's skills levels. Micro- credentials are used to display certain capabilities and skills acquired by an individual (Elliott et al., 2014). They can be used to recognise information about an individual's achievements on acquired skills, and that information can be shared to various people (Fishman et al., 2018). Therefore, micro-credentials can be used to display an individual's acquired skills from the programs completed successfully, but they do not accurately show the level of skill an individual has as a result of the acquired credentials.

How can micro-credentials increase a person's employability?

Group A: micro-credentials are quite beneficial for employment seekers because they show that they have acquired certain skills and knowledge that is relevant to the job they are applying for. As an entrepreneur and employer, individuals with micro-credentials, especially in addition to a traditional qualification, stand a higher chance of getting job opportunities.

Group B: as an entrepreneur and employer, it is currently more beneficial to employ an individual with micro-credentials because they have received relevant training, and they likely have more skills than an individual with a traditional qualification. It is also cheaper to employ an individual with micro-credentials because they can be paid less that individuals with traditional qualifications, therefore, micro-credentials do increase people's employability.

The responses above show that entrepreneurs that are employers do consider individuals with micro-credentials in high regard, because they find that micro-credentials are more relevant and provide individuals with on-demand skills which increases their employability. Micro-credentials allow individuals to create a holistic view of their achievements through the digital badges earned, which can be seen by potential employers (Elliott et al., 2014) on platforms such as LinkedIn (Hall-Ellis, 2016). They allow individuals to build their employability skills by focusing on on-demand skills in the labour market (Wheelahan & Moodie, 2021). They also create opportunities for employment by helping individuals build valuable partnerships (Selvaratnam & Sankey, 2021) which may consist of potential employers.

Which method of learning would you prefer between game-based learning or traditional learning?

Group A: 4 out of 7 entrepreneurs prefer game-based learning because it is a more visual way of learning, more engaging and stimulating. Game-based learning also helps individuals to easily remember information learned. 3 out 7 entrepreneurs prefer a traditional way of learning, with a teacher and learner in a classroom setup. This is because of two reasons: age and the desire to interact with others. The three interviewees

that preferred a traditional learning method are entrepreneurs in their 50s from underprivileged backgrounds. Game-based learning is an unfamiliar concept to them so it might take time to get acquainted with. The second reason was the need to interact with people in person so as to maintain good mental health and to also learn better through in-person collaborations. Some interviewees stated the below in response to the question above:

“I think it’s so much better to have someone to engage with, if you need to ask for guidance. The game-based or self-paced learning requires a lot of motivation from within, because no one checks whether you’ve done the work or not, it’s entirely up to you, but if you have an in-person setup, it sort of forces you to attend classes, and that is just so much better, interacting with other people in person is also necessary for good mental health” – Entrepreneur 4.

“I would prefer a traditional setting, it can be in-person or online, because gamification I think it depends on a number of things, like age, digital skills, exposure, people’s backgrounds etc. Imagine a person from a village, they would be intimidated by the idea of gamification because of their background. For me, it’s more lack of exposure, that’s why I prefer a traditional learning setup for a person my age” – Entrepreneur 2.

Group B: 5 out of 7 entrepreneurs prefer game-based learning because it’s more interactive and easier to remember concepts taught. Two entrepreneurs suggested that a hybrid approach should be considered as an option, especially for mental health concerns which are caused by too much time alone on electrical devices. Some interviewees stated the below in response to the question above:

“Game-based learning really piques my interest. I feel like a classroom setting is a one-way learning method, meaning, typically only the lecturer provides answers, but during game-based learning, it’s an open platform, where you can easily share ideas with other people also learning through the game, that way, answers don’t come from one person but from a broader group of people which exposes you to people’s different ways of thinking” – Entrepreneur 13.

“I think gamification has its merits, because it’s a convenient and easier way to remember things and to learn things. Whereas a traditional setup may require you to go through tons of literature, which is a disadvantage for some people, people with dyslexia for example. My only concern with game-based learning is the fact that it encourages people to stay glued to their computers, which is one of the reasons for poor mental health these days. I think a hybrid approach will be more effective, it allows you to learn from the comfort of your home when learning through games, but to also interact with other people during in-person classes” – Entrepreneur 10.

The responses above show that entrepreneurs mostly prefer game-based learning instead of a traditional learning setup. This is due to the interactive nature of game-based learning, how games allow for collaboration between players, and how they increase memory retention (Aries et al., 2020). Concepts taught through visual tools like games are likely to be remembered longer than concepts taught in a traditional setup (Isabelle, 2020) i.e., a classroom. For the minority of entrepreneurs, the need to interact with others in-person is much greater and of importance. This ties back to section 2.8 where the relatedness construct from the self-determination theory was discussed. According to this construct, when entrepreneurs feel that their human need to connect with other people is satisfied, this increases their intention to adopt micro-credentials.

What are some of your business goals and would you need to better your entrepreneurial skills to acquire those goals?

Group A: entrepreneurs have the common goal to grow their business ventures, be successful and sustainable. In order to achieve these goals, 7 out of 7 entrepreneurs agree that they need to improve their entrepreneurial skills. These skills vary between business management skills, marketing skills, financial management skills, communication skills, networking, leadership, technological skills as well as industry specific skills.

Group B: to expand their businesses, make more sales, and come to a point where their businesses can function without the owner’s presence. In order to achieve these goals, 7 out of 7 entrepreneurs agree that they need to improve their entrepreneurial skills. These skills vary between financial management skills, networking, leadership, and technological

skills, business management skills, marketing skills and innovation skills. Industry specific skills will also need to be improved in order to achieve success.

Entrepreneurs mostly want to be successful and sustainable in their business ventures, and to achieve those goals, they recognise that they need to upskill themselves and acquire core entrepreneurial skills that are necessary for success as well as skills relevant to their various industries. Entrepreneurs need to be life-long learners, continuously upskilling and reskilling themselves. Micro-credentials allow them to upskill themselves in specific areas where they lack adequate skills (Ahmat et al., 2021) and also fosters continuous learning. The business environment is ever-changing, which stresses on the importance of upskilling and reskilling (Brown et al., 2021) entrepreneurs so they can remain relevant in their industries.

How do you think micro-credentials can assist you in achieving some of your business goals?

Group A: micro-credentials allow entrepreneurs to acquire the necessary skills which they need to achieve their business goals, because there are various micro-credentials focusing on various skills which entrepreneurs can leverage.

Group B: entrepreneurs can use micro-credentials to acquire new skills or improve existing skills which are necessary for business success. 7 out of 7 entrepreneurs attest that though not having acquired micro-credentials yet, as awareness of this educational technology increases, it increases the desire and eagerness to acquire relevant micro-credentials.

The responses above show that entrepreneurs can improve core entrepreneurial skills by acquiring relevant micro-credentials. The acquired skills can be applied practically in the business ventures and ultimately lead to the success and sustainability of their businesses.

The data that was collected from the 14 interviewees is summarised in Table 4 below, into themes, sub-themes and findings. The main themes being the information technology profile required to adopt micro-credentials, the prerequisites as well as the deciding factors

to be considered when selecting a micro-credential program to pursue. Each main theme is linked to the corresponding sub-themes and to the findings from the data collection phase.

4.2 FINDINGS AND ANALYSIS

The themes discussed in section 3.4 are depicted in Table 4, each theme with its corresponding sub-theme along with findings from the 14 interviews that were conducted. This table shows the themes that consistently surfaced from secondary literature, as well as primary literature. The below themes and sub-themes are part of the building blocks for the final conceptual framework.

Theme	Sub-theme	Findings
Information Technology (I.T) Profile	Digital literacy	All 14 interviewees mentioned that entrepreneurs need to be computer literate to complete a micro-credential course. Additionally, skills to use other smart gadgets aside from computers are also useful e.g., smartphones, tablets etc since micro-credential courses can be completed from various devices and are not limited to only computers.
	Ability to access and navigate through a micro-credential course	11 interviewees mentioned that entrepreneurs need to be computer literate and have the ability to access the courses as well as know how to navigate around the course content to successfully complete the programme.
Prerequisites	Academic literacy	10 interviewees mentioned that before deciding which micro-credential program to pursue, basic academic literacy is required. All 14 interviewees mentioned that a strong internet connection is required because most
	Strong internet connection	
	Dedicated workspace	

		course content is now shared online. A dedicated workspace was also mentioned as being necessary for a fruitful learning experience.
Micro-credential adoption deciding factors	Comparability	Nine interviewees mentioned that before selecting a micro-credential course, they first determine which skills they want to acquire or improve, then select the course which is relevant to their need. The freedom to choose the course that best suits their need satisfies both the comparability construct and the need for autonomy.
	Complexity	All interviewees mentioned that they opt for micro-credential courses that are easily accessible, especially those offered online, in comparison to those offered in person, making ease of access and ease of use important factors to consider.
	Affordability	Seven interviewees mentioned that they look at the cost of the micro-credentials course before selecting it, the other seven interviewees mentioned that they prioritise the skills they will learn from the course, so the cost is not a major concern, considering that the courses are typically affordable.
	Time constraints	All interviewees mentioned that they consider the amount of time it takes to complete a micro credential course, because entrepreneurs invest most of their time into their businesses and time away from the business can mean

		loss of income, so all interviewees mentioned that they would opt for courses that need less time investment i.e., not longer than 6 months.
	Medium of delivery	Nine interviewees mentioned that they consider whether the micro-credential course is delivered online or in-person, with the preference being online delivery due to the flexibility it affords them. Five interviewees mentioned they would opt for micro-credential courses delivered in-person because that provides a better learning experience for them.
	Method of learning	Nine interviewees mentioned that they prefer a gamified setup due to its benefits of increasing information retention, ability to allow for interactivity and collaboration in an interesting way. Three interviewees preferred a traditional classroom setup, and two preferred a hybrid approach.
	Credibility	12 interviewees asserted that micro-credentials are credible qualifications depending on the institution offering them. Two interviewees were sceptical about the credibility of micro-credentials as a result of them having little exposure to the educational technology and not having had acquired any micro-credentials yet.
	Relative advantage	All 14 interviewees agreed that micro-credentials can potentially help them to improve core entrepreneurial skills and ultimately attain

		their business goals, while spending fewer financial resources and time, as opposed to a traditional qualification.

Table 4: Findings

In addition to the findings discussed in Table 4, Figure 5 shows some interesting findings. From the 14 interviews that were conducted, seven interviewees have acquired micro-credentials (group A) and seven have not yet acquired micro-credentials (group B) but they are aware of the educational technology. All interviewees from group A believe that micro-credentials are credible qualifications, that they can be used to acquire and improve core entrepreneurial skills that ultimately will lead to entrepreneurs achieving their business goals, where their businesses are successful and sustainable. From group B, five interviewees shared the same opinion as the interviewees from group A, though not having micro-credentials themselves, they were confident that micro-credentials are very beneficial in upskilling entrepreneurs. Only two interviewees were sceptical (but not entirely opposed to the idea) of the capabilities micro-credentials can have due to not having first-hand experience with micro-credentials, but they expressed their keenness to acquire micro-credentials in the near future. It is therefore evident, that entrepreneurs are convinced that micro-credentials are capable of assisting them with their skills development.

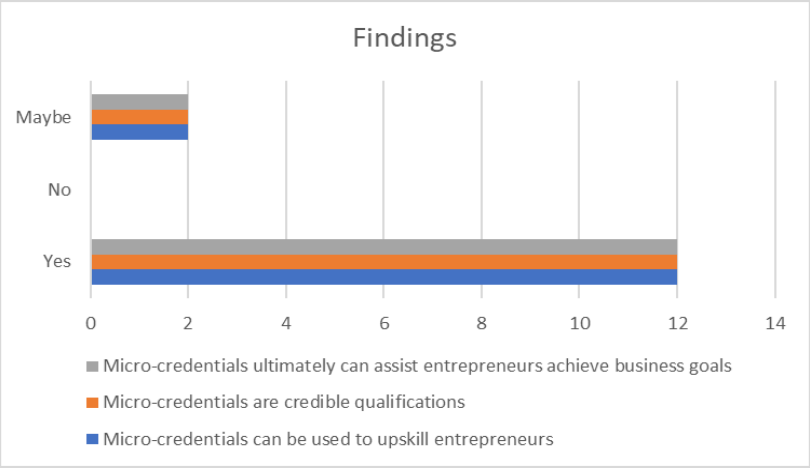

Figure 5: Findings

4.3 CONCEPTUAL FRAMEWORK

The section below explains the conceptual framework developed by the researcher with the aim of assisting entrepreneurs to adopt micro-credentials so they can improve their entrepreneurial skills. Figure 6 shows the first elements of the conceptual framework. These elements were identified from literature discussed in chapter 2, where the importance of entrepreneurial skills development was discussed and deemed as necessary for entrepreneurial success and sustainability. The adoption of micro-credentials that are relevant to entrepreneurs, has the potential to lead to entrepreneurial skills development. Meaning, when entrepreneurs complete micro-credential programs that are focused on the core entrepreneurial skills they need, this results in them improving those core skills or acquiring the core skills if they did not already possess them. As discussed in chapter 2, lack of skills is one of the main reasons why South African business ventures fail, therefore, an increase in core entrepreneurial skills has potential to steer the entrepreneur in the direction of success and sustainability of their businesses. Business success as indicated in Figure 6, can be measured in various ways such as: increased sales and profitability, improved customer satisfaction, improved operational efficiency, improved quality of products and the steady growth of the business. Tracing back to section 4.1, all entrepreneurs who participated in the interviews, mentioned business success as one of their business goals. This shows that all entrepreneurs want their businesses to be successful and profitable. Another goal that entrepreneurs mentioned is the sustainability of their businesses. When sustainability is achieved, businesses will have a sustainable revenue growth, sustainable customer base and market share, as well as sustainable product offerings. The aim of the adoption of micro-credentials is to lead to the skills development of entrepreneurs. The acquisition of core entrepreneurial skills, and the application thereof, ultimately leads to business success and sustainability as indicated below.

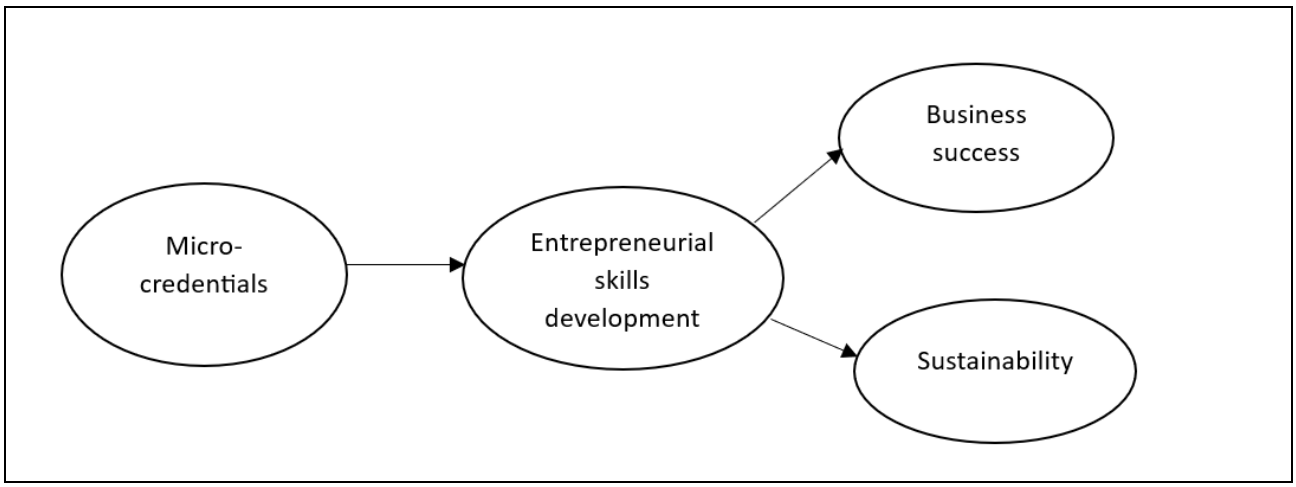

Figure 6: Micro-credential adoption

Figure 7 depicts another element of the conceptual framework. This element consists of various factors that entrepreneurs need to consider when deciding on which micro-credentials to adopt. The factors were identified from the data which was collected from the interviews conducted, as well as from literature discussed in section 2.8. The constructs from the theoretical framework in chapter 2, which were based on the innovation diffusion theory and the skills development theory hold true as they were reemphasised by interviewees, with the exception of the competency construct. According to the data collected, not much was mentioned regarding the need to feel competent when adopting micro-credentials, therefore this construct was excluded from the final conceptual framework.

The following constructs identified in Section 2.8 to be part of the deciding factors for micro-credentials, are consistent with the primary literature and are therefore part of the final conceptual framework:

Comparability: the extent to which entrepreneurs perceive that micro-credentials are able to satisfy their need to upskill themselves.
Relative advantage: the extent to which entrepreneurs perceive that micro-credentials are a better alternative to traditional learning in terms of entrepreneurial skills development.
Complexity: the extent to which entrepreneurs perceive that micro-credentials are easy to access and easy to complete.
Autonomy: the extent to which entrepreneurs feel they have the freedom to choose a micro-credential course which best suits their needs, and the freedom to choose how and

when to complete the course content. This satisfies their need to have control over their actions and behaviours.

Relatedness: the extent to which entrepreneurs are able to interact and collaborate with others while acquiring micro-credentials satisfies the need to relate to others.

The below constructs were identified from primary literature and are part of the final conceptual framework:

Credibility: the extent to which entrepreneurs perceive micro-credentials to be reliable and of good quality.

Affordability: the extent to which entrepreneurs perceive micro-credentials to be affordable.

Time Constraints: the extent to which entrepreneurs perceive micro-credentials to be flexible in terms of time requirements to acquire the credentials.

Medium of delivery: entrepreneurs need to decide which delivery method is best for them, whether in-person, online, or hybrid. Some entrepreneurs prefer a hybrid method, which allows them to interact with other people during their learning experience. This ties back to relatedness, a construct discussed in section 2.8.

Method of learning: entrepreneurs need to decide the learning method that best suits their needs, for example, a traditional classroom setup, a gamified setup, or a combination of both.

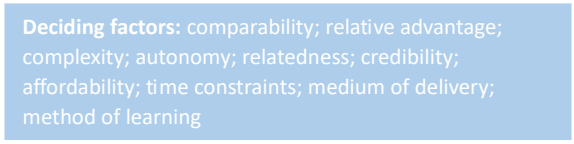

Figure 7: Deciding factors for micro-credential adoption

Figure 8 below depicts the prerequisites of micro-credential adoption which were identified from primary literature. Before an entrepreneur decides on which micro-credential program to pursue, they need to ensure that they have basic academic literacy skills, this means having the basic ability to understand the content they will have to work through during the micro-credential program. Entrepreneurs also need to ensure they have a stable internet connection, this is typically required to access course content for research during the course, sometimes for assessments and tests as well. For online offered programs, a

stable internet connection is a definite necessity. Lastly, entrepreneurs also need a dedicated workspace from where they can focus on their learning and training. This was highlighted as being important by some of the entrepreneurs during the interviews conducted, because a dedicated workspace allows entrepreneurs to shift their focus and mindset from the demands of business to learning and training.

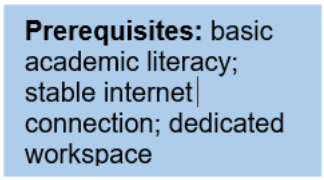

Figure 8: Prerequisites of micro-credential adoption

Figure 9 below depicts the information technology (IT) profile which entrepreneurs need to acquire micro-credentials. The current ways of learning require entrepreneurs to have basic IT skills, namely the ability to operate on a computer or similar device, as well as digital literacy skills. Learning content is typically shared via digital devices, assessments and tests can also be taken remotely on a digital device, this makes it important for entrepreneurs to have the know-how to navigate and use these devices easily.

Figure 9: IT profile

Figure 10 depicts the core entrepreneurial skills as identified by Kruger and Steyn (2021) and discussed in chapter 2. Entrepreneurs are encouraged to attain these skills and apply them in their businesses. From the primary data which was collected and analysed in section 4.1, entrepreneurs identified the below skills as being some of the skills which are necessary for them to achieve their business goals. Entrepreneurs need to adopt relevant micro-credentials, that are focused and targeted at improving the below skills.

Figure 10: Core entrepreneurial skills

4.4 COMBINED CONCEPTUAL FRAMEWORK

The conceptual framework was created based on the analysis from findings as well as design principles of existing frameworks from current literature. The framework depicted in Figure 11 posits that there is a direct relationship between micro-credential adoption and entrepreneurial skills development, as micro-credentials provide the opportunity for individuals to enhance skills (Ghasia et al., 2019). According to the findings and analysis done from the data which was collected, it is evident that entrepreneurs who acquire micro-credentials see a development and an increase in core entrepreneurial skills that are necessary for business success, depending on the focus of the micro-credential course completed. Entrepreneurs can acquire micro-credentials with a focus on entrepreneurial skills (Yieng & Haron, 2023) such as: networking skills, financial skills, business management, technology skills, innovation skills, creativity skills, leadership, and communication skills (Kruger & Steyn, 2021), among many others. It is therefore of paramount importance to ensure that the correct micro-credential courses are selected and completed. To assist entrepreneurs with this decision, the framework states a series of factors to be considered: firstly, the entrepreneur needs to decide which entrepreneurial skills they need to acquire or improve, once this is established, they can search for relevant courses that satisfy the skills required, during the search for the right micro-credential course to complete, entrepreneurs are to consider course affordability, complexity, as well as time and effort requirements of the course. The entrepreneur also needs to ensure they have adequate digital literacy, computer literacy and basic academic literacy skills. They should also ensure that prerequisites such as the technological resources required are met. Thereafter, they can complete the micro-credential course and acquire a digital badge upon completion and lastly, apply the skills acquired (Lim et al., 2018) into their business operations. Micro-credentials provide entrepreneurs with practical

knowledge and skills, and when the skills acquired are applied correctly, entrepreneurs are bound to see the results.

The framework then continues to show a direct relationship between entrepreneurial skills development and successful entrepreneurial ventures. When entrepreneurs have the necessary skills to conduct and manage their businesses, that results in successful businesses which are profitable and efficient (Al-Abri et al., 2018). Lastly, the framework shows a direct relationship between entrepreneurial skills development and sustainability (Fatoki, 2018), where there is stability in the business growth, steady revenue growth, market share and product offerings. The proposed conceptual framework in Figure 11 aims to assist entrepreneurs with the adoption of micro-credentials for the purpose of entrepreneurial skills development. The framework depicts a relationship between four main elements - micro-credential adoption which leads to entrepreneurial skills development, which leads to successful business ventures, and ultimately results in the sustainability thereof.

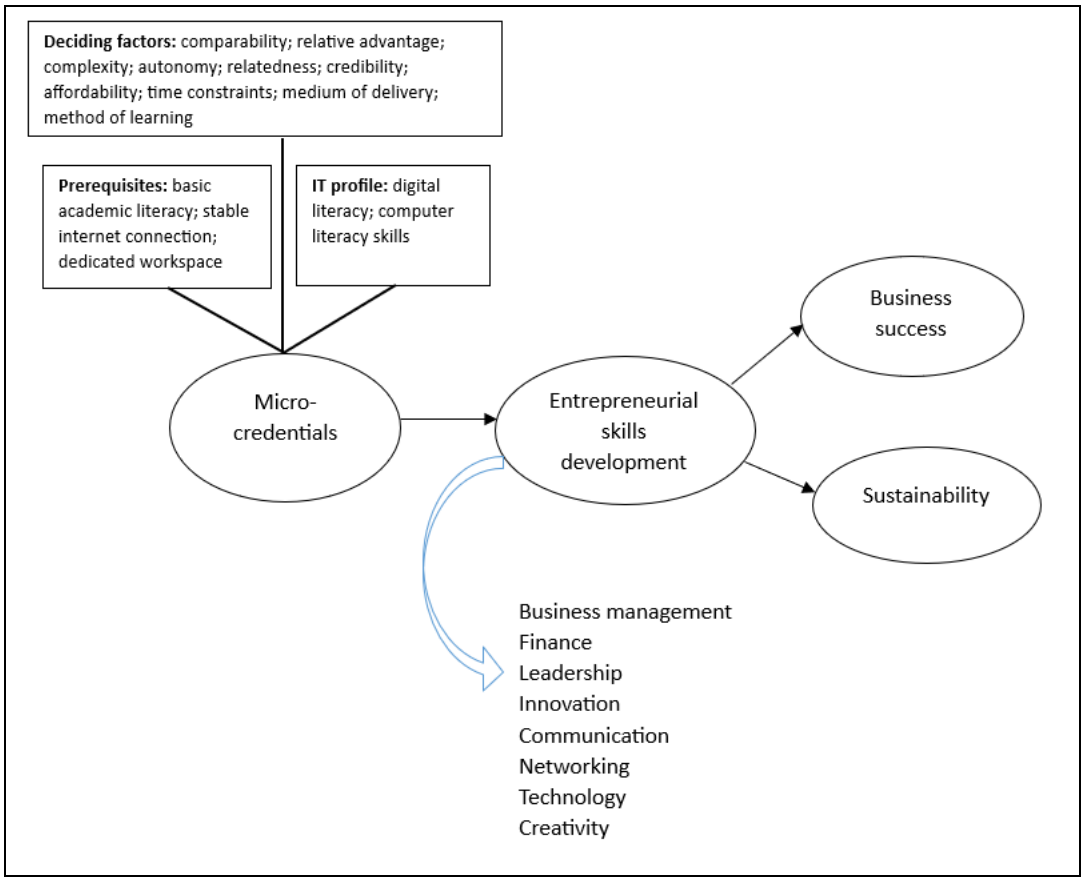

Figure 11: Combined conceptual framework for micro-credential adoption

4.5 CONCLUSION

The analysis from the findings depict that micro-credentials are a beneficial educational technology that entrepreneurs can use for their skills development. The proposed conceptual framework, which explains the relationship between the identified factors (micro-credentials, entrepreneurial skills development, successful business ventures and sustainability) can be used by entrepreneurs to adopt micro-credentials that are relevant and helpful in improving the skills that entrepreneurs need to be successful and sustainable in their businesses. The conceptual framework developed and depicted in Figure 11, aligns with the theoretical framework developed from secondary literature in section 2.8.

5 INTRODUCTION

This chapter provides details on the summary of findings, where each of the research questions which are stipulated in chapter 1 are answered, the summary of contributions is then discussed – where the conceptual and theoretical contributions are stated, following that, directions for future research are pointed out, and lastly the concluding remarks are provided.

5.1 SUMMARY OF FINDINGS

This section provides answers to the research questions stipulated in chapter 1. The answers are derived from primary and secondary literature from chapter 2 and chapter 4. Firstly, each of the four sub-questions are discussed and lastly the main question is answered.

Which core skills should South African entrepreneurs possess to remain sustainable in their businesses?

As discussed in section 2.2, there are various skills which entrepreneurs can acquire that have the potential to fuel them towards success and sustainability. However, the following skills proved to be consistent from the various secondary literature which was taken into consideration: innovation skills, creativity skills, business and technology skills, leadership, and communication skills, as well as networking and sales skills (Kruger & Steyn, 2021). These eight skills make up the core entrepreneurial skills required for successful and sustainable businesses. This study acknowledges that there are various additional entrepreneurial skills that are also deemed as necessary, however, for this research, the aforementioned skills were identified as the core skills needed by entrepreneurs to thrive in a technology-driven, ever-changing business environment.

From the findings discussed in chapter 4, entrepreneurs were concerned about improving their industry specific skills alongside their sales skills in order to attract more high value customers, others were concerned about improving their technological skills in an effort to remain relevant in a technology-driven industry. Others were concerned about improving their financial management skills because every business venture aims to generate profit and to achieve that goal, finances need to be managed effectively. Other entrepreneurial skills such as the ability to work in a team, to communicate well, marketing skills, general business skills, ability to be innovative, as well as networking skills, were also deemed as

necessary for entrepreneurial success. These skills were consistent with the ones identified from the secondary literature which was discussed in chapter 2.

What is the Information and Communications Technology (ICT) profile that entrepreneurs should have to adopt micro-credentials?

Micro-credentials are delivered in various ways, either through online courses, workshops, or interactive modules (Nkosikhona et al., 2022). The findings discussed in section 4.1, indicate that because micro-credentials are typically offered online (Yieng & Haron, 2023), and in cases where they are offered in person or through a hybrid approach, course content is usually available on a learning platform or application hosted online, which requires information technology skills to access and navigate. Entrepreneurs therefore need to possess fundamental digital literacy and computer literacy skills, so that they are able to easily navigate through devices and applications from where they learn.

What are the barriers towards micro-credential adoption?

As discussed in section 2.4, the credibility of micro-credentials is one of the main reasons why some individuals are reluctant to adopt the educational technology (Fishman et al., 2018). Some individuals still question whether micro-credentials are truly as credible as traditional qualifications such as university and college degrees and diplomas, this stems from the uncertainty of the standards used by micro-credential providers and governing bodies to evaluate the value of the credentials (Chen et al., 2021). Access to technological resources like computers and access to the internet is essential for pursuing micro-credentials, this can be a barrier for individuals with limited internet connectivity, insufficient digital literacy and lack of other technological resources (Orrensalo & Nikou, 2021).

In section 2.8, the diffusion of micro-credentials is discussed as one of the barriers towards micro-credential adoption. When entrepreneurs are unaware of the availability of micro-credentials and its potential benefits, they are unable to adopt the technology. The diffusion of micro-credentials is also affected by the credibility of the credentials. When the credibility is questioned, it leads to a reduction in the spread of the information about micro-credentials, however, measures and guidelines (which are stated in section 4.1) are available for micro-credential providers to ensure they develop programs that are credible and of good quality. Findings discussed in section 4.1 also indicate that some individuals

may have difficulties adopting micro-credentials due to the lack of exposure and knowledge of the available programs. However, as awareness on micro-credentials gradually increases, information about available programs can be easily accessed on various platforms such as Google or LinkedIn (Hunt et al., 2020).

What are the essential characteristics of a micro-credential ecosystem for entrepreneurial skills development?

As discussed in section 4.1, micro-credentials are outcome based, personalised, industry driven, on-demand and transparent. Micro-credential programs are also short, concentrated, modular and stackable (Brauer, 2023) as discussed in section 2.4. This means they are focused on specific skills, they are flexible by allowing entrepreneurs to review learning content at the time of their choosing, and various credentials can be acquired and collected over time to improve an individual's skillset. As discussed in section 2.4, the micro-credential ecosystem consists of the players and the product. The players being the individuals completing the MC program, the issuing bodies, industry partners and assessers, and the product being the MC program being offered, the course content and structure of the program (Berry, 2017). The overal ecosystem is interconnected and it governs the process of acquiring a micro-credential.

Main question: What are the constructs of a conceptual framework for adopting micro-credentials for skills development of South African entrepreneurs?

The constructs of the micro-credential adoption framework are discussed in detail in section 4.3 and 4.4. Figure 11 depicts the combined conceptual framework which was developed from relevant constructs identified from primary and secondary literature. The conceptual framework is developed based on the constructs from the innovation diffusion theory as well as the self-determination theory, additionally, key themes that were identified from primary literature were also added to develop the complete conceptual framework. The constructs, as identified from the innovation diffusion theory and the self-determination theory, can be described as follows: complexity of micro-credential programs, their relative advantage in comparison to other training options, their comparability in terms of their ability to meet the skills needs of entrepreneurs, the human need for autonomy where entrepreneurs have the freedom to select which micro-credential programs to enrol in, how to complete the program and when to do so, lastly, the human need to feel connected to other people. In addition to these, other constructs were

identified from primary literature, namely, affordability, time constraints, medium of delivery, and method of learning. These make up the deciding factors which entrepreneurs need to consider when selecting micro-credential programs to pursue. The I.T profile which consists of digital literacy skills and computer literacy skills, was also identified from primary literature. The prerequisites which need to be taken into consideration were identified from primary literature as well, and lastly, the core entrepreneurial skills which entrepreneurs need to attain success and sustainably were identified from secondary literature. All the constructs which were identified from the primary and secondary literature were collectively used to develop the conceptual framework in Figure 11, which can be used for micro-credential adoption with the aim of entrepreneurial skills development.

5.2 SUMMARY OF CONTRIBUTIONS

The research paper focused on micro-credential adoption for entrepreneurial skills development, which is a topic that has not yet been widely explored by many researchers. There are studies on micro-credentials in the context of higher education, as well as for professional development, but not a significant number of studies have focused on micro-credentials in the context of entrepreneurial skills development. This study explored this gap and provided insight into this topic based on primary and secondary literature. A conceptual framework was produced as a result of this research, the framework can be used by entrepreneurs as a base when adopting micro-credentials for their skills development.

This paper also made a theoretical contribution, where the innovation diffusion theory and self-determination theory were applied to micro-credential research which has not been widely explored as well. This study acknowledges that these theories have been explored in the information technology discipline but not specifically on micro-credentials in the context of entrepreneurial skills development. Constructs such as comparability, complexity, and relative advantage, were taken from the innovation diffusion theory and applied to micro-credential adoption, likewise, constructs such as autonomy and relatedness were taken from the self-determination theory and applied to micro-credential adoption. These constructs surfaced in the primary literature analysed in chapter 4 which means they do have an influence on micro-credential adoption as they have an impact on the entrepreneurs' intention to adopt micro-credentials for their skills development.

5.3 FUTURE RESEARCH

This study was focused on small business entrepreneurs, a suggestion for future research is to include large businesses and determine whether the developed framework is applicable for entrepreneurs who own larger enterprises. This study only considered a South African context, future research can expand the conceptual framework to incorporate constructs that are relevant to international entrepreneurs. This study was also not industry specific, various industries were considered but not all industries could be part of the research, such as the health industry, finance, agriculture, construction, real estate etc. Future research can also focus on entrepreneurs in industries that were not explored, to determine whether the developed framework is applicable for those entrepreneurs as well.

5.4 CONCLUSION

This study focused on micro-credentials and how entrepreneurs can use them to improve their core entrepreneurial skills. A conceptual framework was produced which entrepreneurs can use as a guide when adopting micro-credentials. Lack of skills was identified to be one of the main reasons why many South African business ventures fail, therefore, the need for entrepreneurs to continually upskill themselves, cannot be over-emphasised. It therefore begs for entrepreneurs to make use of the tools available to them, i.e. micro-credentials, to enhance the necessary skills that they need to be successful and sustainable in their business ventures.

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Appendix A

A conceptual framework for adopting micro-credentials for skills development of South African entrepreneurs

Thank you for participating in this research. Your input in this research will assist to create a framework that your business can use to adopt micro-credentials which in turn will lead to you developing your entrepreneurial skills. Upskilling yourself as a small business entrepreneur will drive your business towards success and sustainability. The below section provides a brief description of this research and states the purpose of the research. When the findings from this research are analysed and the conclusions are drawn, participants of this research will receive a synopsis of the findings which your business can use for the adoption of micro-credentials.

One of the reasons why entrepreneurs fail is the lack of adequate entrepreneurial skills (Zizile & Tendai, 2018). Thus, with the vast advantages provided by educational technologies, entrepreneurs should harness these technologies for their entrepreneurial skills development. This then begs the question, how do South African entrepreneurs take advantage of available educational technologies (and their many benefits) for skills development (Kruger & Steyn, 2020)? An emerging educational technology that can be utilised to develop the skills of entrepreneurs is micro-credentials; generally defined as short, verified courses, where successful candidates are presented with a digital certificate or a digital badge after the completion of the course (Rossiter & Tynan, 2019). Micro-credentials are fairly new so there has been little exploration of the technology in the entrepreneurial context. This paper aims to bring to light, the contribution micro-credentials can have in the pursuit of entrepreneurial skills development. This study aims to produce a conceptual framework that entrepreneurs can use to adopt micro-credentials to improve their entrepreneurial skills. The skills to be studied in this paper were identified by Kruger and Steyn, (2020) as the core competencies that entrepreneurs need to possess to attain a competitive advantage in the business world. Namely, innovation skills, creativity, leadership, communication, networking, sales, business, and technology skills.

Interviewee: _____

Date: _____

Open-ended interview questions:

1. What are the technological skills that entrepreneurs need to acquire micro-credentials?
2. How much effort does it take to acquire a micro-credential?
3. What are the facilitating conditions needed to acquire micro-credentials?
4. How easy is it to access a course that rewards you with a micro-credential upon completion?
5. How does acquiring micro-credentials contribute to an entrepreneur's skills levels?
6. How is training conducted within your organisation? In terms of the medium of delivery, in person or online?
7. Which skills do you aim to improve through micro-credentials?
8. How long does it usually take to complete a micro-credential?
9. Do you find value in acquiring micro-credentials instead of a traditional university degree? If so, why, or why not?
10. How do you decide which micro-credential to adopt?
11. How do you measure your skills levels? Through years of experience, education acquired?
12. What do you wish to gain from a micro-credential?
13. How much flexibility does micro-credentials allow you in comparison to a traditional university or college degree?
14. Would you say micro-credentials are as credible as qualifications acquired from universities and colleges? Why or why not?
15. Do you think micro-credentials accurately depict a person's skills levels, please justify your answer?
16. How can micro-credentials increase a person's employability?
17. Which method of learning would you prefer between game-based learning or traditional learning
18. What are some of your business goals and would you need to better your entrepreneurial skills to acquire those goals?
19. Do you think micro-credentials can assist you in achieving some of your business goals? How?

Appendix B

Combined Letter of Introduction and Informed Consent

Department of Informatics

Title of the study
A conceptual framework for adopting micro-credentials for skills development of South African entrepreneurs.

Research conducted by:
Name: Ms TS Marecha
Student number: u18031014
Cell Phone: 0786026803

Dear Participant

You are invited to participate in an academic research study conducted by Takunda Sharon Marecha, a Masters student from the Department of Informatics at the University of Pretoria.

The purpose of the study is to assist entrepreneurs with the adoption of micro-credentials for their skills development.

Please note the following:

- This is an anonymous study and your personal information will not appear on any transcript. The responses you give will be treated as strictly confidential as you cannot be identified in person based on the answers you give.
- Your participation in this study is very important to us. You may, however, choose not to participate and you may also stop participating at any time without any negative consequences.
- I understand that all data collected for this study will be stored on a safe and secure platform as governed by the University of Pretoria's Research Data Management Policy.
- Please answer the questions asked during the interview as completely and honestly as possible. This should not take more than 30 minutes of your time
- The results of the study will be used for academic purposes only and may be published in an academic journal. We will provide you with a summary of our findings on request.
- Please contact my study leader, Prof R Steyn at riana.steyn@up.ac.za if you have any questions or comments regarding the study.
- The supervisor will also have secondary access to the data to confirm the analysis.

In research of this nature the study leader may wish to contact respondents to verify the authenticity of data gathered by the researcher. It is understood that any personal contact details that you may provide will be used only for this purpose and will not compromise your anonymity or the confidentiality of your participation.

Please sign the form to indicate that:

- You have read and understand the information provided above.
- You give your consent to participate in the study on a voluntary basis.

_____ _____

Participant's signature **Date**