ICPU1003-004 GROUP REPORT

COVID-19 & THE RISE OF MICRO-CREDENTIALS

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Executive Summary

The Australian higher education (HE) sector is facing many challenges, many of which have been exacerbated by COVID-19. Specifically, the pandemic has accelerated the popularity of 'micro-credentials'; short, formative courses that are typically taken online. Our aim was to develop a series of student led recommendations to assist key stakeholders (business, universities, students and Accenture) in the Australian HE sector in reconceptualizing the model of tertiary education as a response to the growing popularity of micro-credentialing in the COVID economy. By leveraging the interdisciplinary of our team through the truncated design thinking approach, we identified three key trends driving the rise of micro-credentials in Australia: the changing world of work, a flourishing culture of continuous learning and the disruptive effects of COVID-19.

Specifically, we found that the themes of technological innovation and automation are responsible for driving these trends. The normalisation of online learning due to COVID-19 has also made micro-credentialing more appealing as a source for skills and knowledge. Significantly, the findings of our primary research survey indicated that micro-credentialing cannot replace the traditional university education model - it is merely a supplement that aims to fill the gaps in skills and knowledge. Other findings further highlighted issues relating to the legitimacy of micro-credentials. In line with our findings, our recommendation is that Accenture should develop an exclusive accreditation framework for micro-credentialing to take advantage of the trends in life-long learning and the changing world of work that have been accelerated by COVID-19. This framework will run parallel to the existing Australia Qualifications Framework and will be exclusive to Australian universities. Businesses, universities and students will all benefit from its implementation as it allows micro-credentials to be accredited and formally recognised.

1. Introduction

The purpose of this report is to present Accenture with a comprehensive student-led recommendation detailing how the Australian HE (HE) sector can integrate micro-credentials into the current paradigm of Australian HE. The recommendation detailed in this report was developed from a comprehensive review of the current literature pertaining to the trends influencing the popularity of micro-credentials as well as through the analysis of data collected from a survey instrument disseminated to university students. This data was analysed by leveraging the interdisciplinary skills and knowledge of each group member to provide a holistic, comprehensive recommendation.

1.1 The Australian HE Sector

The current paradigm of the Australian HE sector has been challenged due to the recent emergence of the COVID-19 pandemic (Thatcher, et. al., 2020). According to the Australian Bureau of Statistics (2020), the HE sector contributes $37.6 billion to the Australian economy, making it the country's largest service industry (see Figure 1). It is responsible for the employment of over 40,000 Australians and the concurrent education of 1.4 million students (Jackson, 2019). 58% of current students are undergraduates enrolled in three-year programs, while the remainder are engaged in research and postgraduate programs (Halloran, 2019). Currently, there are over 43 institutions that form the Australian HE sector, consisting of public and private institutions (Studies Australia, 2020).

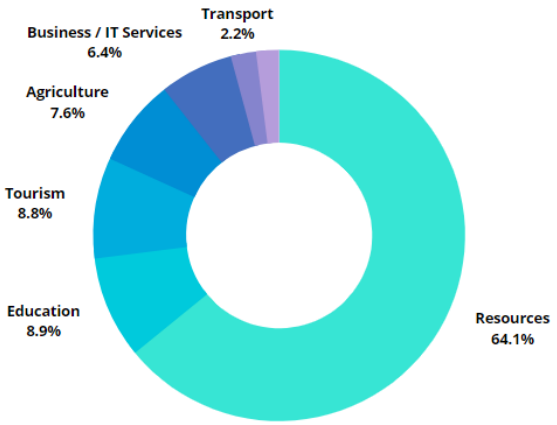


Figure 1: *Breakdown of Australian Exports 2019 (ABS, 2020)*

1.2 The rise of micro-credentialing

Pickard et. al. (2018) defines micro-credentials as "any accreditation that covers more than a single course but is less than a full degree." Current micro-credentials are typically short, self-paced, online courses with knowledge tested via formative assessment (Blazevic, 2020). These courses help equip learners with specialised knowledge, typically in business and technology, which comprise 73% of all micro-credentials undertaken in 2019 (Shah, 2020).

Recently, micro-credentials provided by private enterprises have emerged as a popular choice to augment traditional HE degrees (Kato, et. al., 2020). The most popular providers tend to be private organisations such as Coursera and Udemy (Shah, 2020). Recently, a number of Australian universities, such as Swinburne University and the University of Melbourne, have also begun to offer micro-credentials (Milligan, 2019). Their appeal can be attributed to their lower fees, flexibility and versatility relative to traditional university qualifications (Cawood, et. al., 2018). These factors inevitably pose a significant challenge to the current university model. Nonetheless, universities maintain a secure grasp on HE, as micro-credentials within Australia currently lack a system of formal accreditation. Cochrane (2019) writes that Australia is becoming an outlier in the field of micro-credentials due to the absence of a unified system of accreditation for micro-credentials, such as those that exist in Scotland, Ireland and New Zealand. The Scottish and Irish qualification systems both incorporate short qualifications into multi-level frameworks that 'provide a lateral comparison of knowledge, skills and competency' (Department of Education and Training, 2018). Comparatively, the New Zealand system allows learners to 'report their achievement [of a micro-credential] to the New Zealand Qualifications Authority so it is displayed on their New Zealand Record of Achievement' (NZQA, 2018).

Australian universities have, until 2020, been unwilling to engage in the process of reforming the current qualifications framework to accommodate and accredit micro-credentials earned from private enterprises (Oliver, 2019). However, as shown by the

examples of Scotland, Ireland and New Zealand, the creation and development of a holistic framework that incorporates micro-credentials into the HE qualifications system reflects growing trends in learners', employers' and industries' demand for focused skills development.

1.3 The impact of COVID-19 on micro-credentialing

The economic effects of the COVID-19 pandemic has led many to question the value of current university degrees in preparing students for a 'changing world of work' (Muro, 2020). Specifically, the pandemic has accelerated the movement towards an automated, digitalised economy. According to data compiled by Lund (2020), 85% of companies plan to accelerate digitisation as a result of the pandemic, increasing operations in artificial intelligence and automation by 67% (see Figure 2). This growing importance of technology in the workplace has placed increased pressure on students and employees to attain the necessary hard skills, such as coding, to remain relevant in the post-COVID economy. These hard skills are often absent from current university degrees but comprise the majority of micro-credentialing courses. This employment pressure has led many working professionals to upskill via micro-credentialing courses. Popular providers include Coursera, a popular private provider of micro-credentialing courses which reported a 520% increase in enrolments worldwide during the first quarter of 2020 (Sheng, 2020). This growing popularity of micro-credentialing courses provided by private enterprises has a profound impact on postgraduate university education as a means of practising continuous learning, calling into question the practicality and validity of the broader university model in Australia.

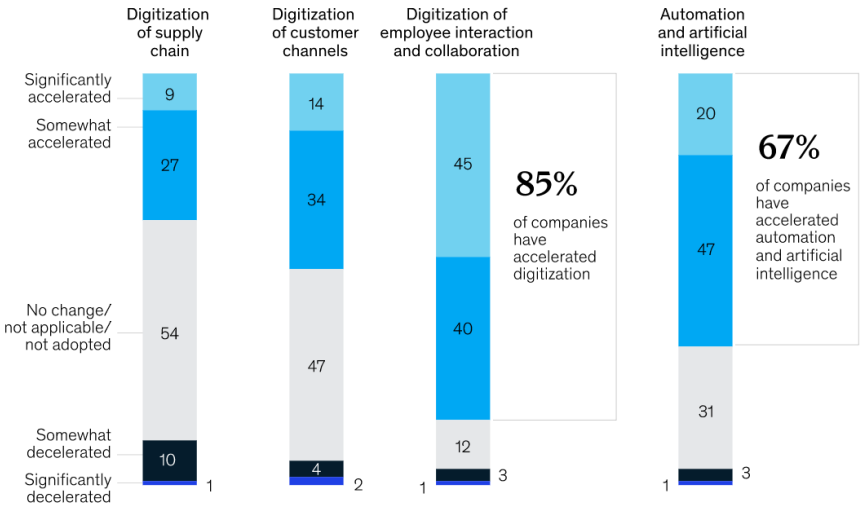


Figure 2: *Since the start of the COVID-19 pandemic, how has your company's adoption of the following technologies changed? % of respondents (n=800) (McKinsey & Co., 2020)*

1.4 Aims and Objectives

The emergence of the global COVID-19 pandemic has accelerated many pre-existing trends that impact Australian HE. However, the model of micro-credentialing as a method of educational attainment has not been sufficiently discussed in the context of Australian HE post-COVID-19.

We aim to develop a series of student led recommendations to assist stakeholders (business, universities, students and Accenture) in the Australian HE sector in reconceptualizing the model of tertiary education as a response to the growing popularity of micro-credentialing in the post-COVID economy.

The following objectives will help in shaping the direction of research needed in the pursuit of our aim.

1. To **understand** how various trends, such as COVID-19, the changing world of work and increased prevalence of life-long learning are contributing to the popularity of micro-credentialing
2. To **explore** how students view micro-credentialing compared to conventional tertiary education in providing relevant skills needed for their future career
3. To **develop** a framework that allows Australian Universities to effectively compete against local and global education service providers to deliver flexible credentials in a disrupted workplace.

2. Approaches & Methods

2.1 Approach

The team adapted a design thinking research methodology to achieve the proposed aims and objectives of the project. Our three objectives were developed in accordance with the three phases of design thinking. Within each phase of the truncated design thinking approach, various research methods and techniques were adopted. As such, design thinking is utilised as a broad, overarching means to frame and organise our research (See Figure 3).

1. ***Empathise (Objective 1***): The team employed a literature review to develop an extensive understanding of the nature and rise of micro-credentialing and empathise with its various stakeholders.
2. ***Define (Objective 2***): The team synthesised knowledge ascertained in the empathise stage to define and articulate a problem statement, which was then interrogated through the coordination of a stakeholder analysis and a primary research survey.
3. ***Ideate (Objective 3***): The ideate phase involved all team members in the generation and incubation of ideas, solutions and approaches to develop a university model that can effectively compete against local and global education service providers to deliver flexible credentials in a disrupted learning environment. This was achieved through the statistical analysis of the quantitative data obtained from the research survey accompanied by the consideration of the findings obtained through the literature review to determine the most robust and viable solution.

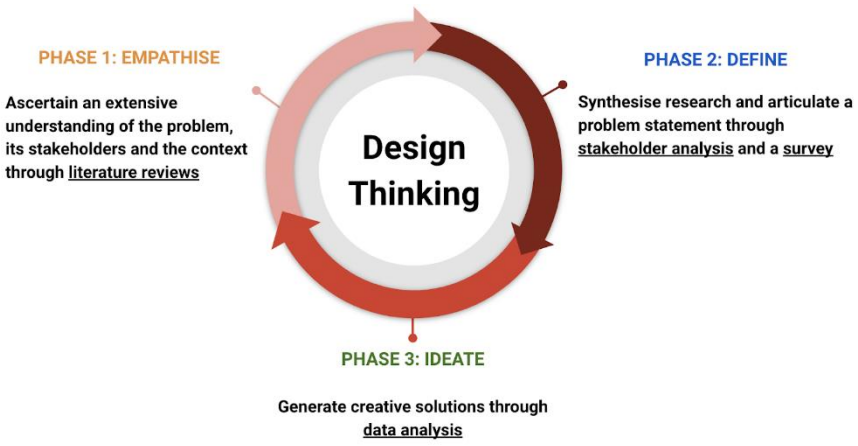


Figure 3: *Diagram illustrating the truncated design thinking approach applied by the group to guide the completion of approaches and methods*

2.2 Justify research methodology

Design thinking ‘blends an end-user focus with multidisciplinary collaboration and iterative improvement’ (Nakano, et. al., 2018, p. 746) to produce innovative solutions. It is a dynamic, human-centred approach that integrates different interdisciplinary skills and perspectives needed to develop holistic solutions to complex problems. Given the broad implications of micro-credentials and the COVID-19 pandemic on the Australian HE sector, the design thinking approach can be applied to the complex problem to ‘create disruptive solutions that meet the needs of people in entirely new ways’ (ibid., p. 745). Three research methods that leveraged the interdisciplinarity of the group were used to inform the creation of our recommendation.

Literature reviews assist in integrating various empirical and qualitative findings from a plurality of perspectives, allowing for the definition of the overall problem space. (Snyder, 2019). Each group member was responsible for analysing a trend driving the popularity of micro-credentialing in Australia. This corresponds with our objective of understanding the prevalent forces driving the popularity of micro-credentialing in Australia. Emphasis was placed on industry whitepapers and peer-reviewed literature, with each group member choosing to explore a trend that most closely aligned to their own disciplinary knowledge. This literature was primarily found by utilising the library resources of The University of Sydney as well as whitepapers published by the Australian Qualifications Framework. This allowed the group to form a comprehensive understanding of the factors contributing to the popularity of micro-credentials and their role in education.

The group also conducted a primary research survey to develop an understanding of the attitudes of students towards micro-credentialing. This allowed for the attainment of primary qualitative and quantitative data to inform the final recommendation. Utilising convenience sampling, an online survey developed using Google Forms was disseminated to 34 respondents. The survey used a combination of question types such as multiple choice, ratings scales and open-ended responses to understand the perspective of students regarding micro-credentials and HE in general. An analysis of the survey, utilizing statistical techniques, provided a primary data set which informed us of the views of students towards micro-credentialing.

A stakeholder analysis was used to examine the key groups that have a vested interest in micro-credentials within Australia. This was used to categorize stakeholders based on their level of interest, participation and influence in the project (Nguyen, et. al., 2018). This allowed the group to better understand how to engage with key groups and satisfy their respective needs. This research was important in understanding which groups to target when formulating our recommendation. The stakeholder analysis was performed by a group member that had prior experience in the field of project management, allowing for the group to leverage his past experience in stakeholder analysis for the benefit of this project.

2.3 Disciplinary perspectives / approaches employed by group

Group Members	Discipline	Specialisations & Primary Attribute
Antonio Baxter	Bachelor of Science / Bachelor of Advanced Studies (Immunology, Pathology & Marketing)	A disciplinary background in Immunology and Marketing has provided Antonio with the necessary skills required to conduct a comprehensive literature review into the trends driving micro-credentialing. His scientific background in data collation & analysis has also helped in developing insights from the data and understanding how learners perceive micro-credentials. His past experience working in a diverse workplace has also assisted him in the development of his time management and motivation skills, which has helped to guide the team through the design thinking approach.
Stanley Dong	Bachelor of Commerce / Bachelor of Advanced Studies (Finance & Data Science)	With a disciplinary background in Finance and Data science, Stanley approaches problem-solving from a highly data-driven perspective but is also interested in examining issues from a financial point of view. His strong understanding in the nature of data was useful in identifying trends and also potential limitations with the group's primary research survey. Besides his academic experience, his experience working in a number of firms has honed his ability to think realistically and practically, skills that are crucial for collaborative teamwork.

Natasha Hau	Bachelor of Arts (International Relations, Spanish & Latin American Studies)	Natasha's disciplinary background in International Relations affords her with various theoretical and analytical frameworks to consider particular phenomena in an international context. She is experienced in collecting, consulting and analysing both qualitative and quantitative data, with an emphasis on the former, which allowed her to comfortably conduct a literature review into the nature and rise of micro-credentials in both the local and international context. Furthermore, her work experience in teaching also contributed to her critical role in presentations.
Kevin Surya	Bachelor of Commerce (Marketing & Project Management)	Kevin's disciplinary background in Marketing and Project Management grants him the development and mastery in certain skills such as critical thinking, teamwork and communication, which are essential in interdisciplinary teamwork. His marketing background allows him the ability to construct and analyse the online survey conducted in order to gain quantitative and qualitative insights that are essential for the research topic, and his Project Management background grants him the ability to utilize frameworks to analyse stakeholders involved in the implementation of proposed recommendations. management. His Marketing major has enabled him to skilfully conduct market research and utilise the market mix, as well as conducting primary research and analysing the market to generate the most efficient and effective strategy to approach consumers
Catherine Zhang	Bachelor of Commerce (Finance & Business Analytics)	Catherine's disciplinary background in Finance and Business Analytics equips her with the ability to conduct comprehensive and quantitative analysis for the online survey data, with heavy focus on using analytical thinking and quantitative methods to decompose survey data and bring up business insights and implications by re-constructing information. Her global work experience in finance, strategy consulting and business analytical intelligence sectors also provide her qualitative research ability to analyse the rising trend of lifelong learning and find the key stakeholders in the complex setting.

3. Findings & Results

To develop a comprehensive understanding of the prevalent macro-environmental trends driving the adoption of micro-credentials and their potential effect on stakeholders in the Australian HE sector a literature review of relevant whitepapers was undertaken. Key factors driving the rise of micro-credentials include the changing world of work, the rise of life-long learning and the COVID-19 pandemic accelerating trends in digitisation across the economy.

3.1 Changing world of work

The changing world of work has been identified by many scholars as a central driver motivating individuals to include micro-credentials in their educational portfolio. According to Gauthier (2020), the increased importance of technology represents the most important factor driving the broad changes seen in the way in which businesses now operate. In recent years, technological innovation has increased exponentially, subsequently affecting the landscape of the workplace and the way in which individuals approach work. As stated by Walsh (2017) the days of having a 'job for life' are over, with multiple role changes having become the new norm. This has been noted in a survey conducted by Kovács-Ondrejkovic (2020), with 61% of respondents stating they expect to change jobs due to technological advances. Although technology will consequently make up to 30% of traditional jobs, and an estimated 40% of existing university degrees, obsolete, the amount of opportunities created by technology will exceed the job losses (Manyika, et. al., 2017; Deloitte, 2019). A great number of these jobs have been termed as 'Superjobs', jobs that leverage technology to their advantage but retain aspects of the traditional role (Deloitte, 2019). Furthermore. the growth in demand for 'Enterprise Skills', such as 'Digital literacy', 'Critical Thinking', 'Creativity', 'Problem Solving' and 'Presentation skills' by employers, highlights the shift away from technical skills, which are specific to certain industries, to these set of transferable and highly valued skills, irrespective of the

industry (JobSearch, n.d.). This is in response to the changing role requirements as technical skills can easily become outdated whilst enterprise skills are always relevant and, in a way, 'future proof'. As a result, many people, both employees and employers, have turned towards micro-credentialing to help bridge those gaps in skills and knowledge in order to become more qualified and successful.

3.2 Lifelong Learning

According to Selingo (2013), the rapid evolution of technology and its commensurate skill requirements has spawned the third wave of education; continual life-long learning. This is having a widespread impact on the way in which individuals are approaching learning, with many individuals looking to either up-skill or re-skill to meet the demands of the future workplace (Nambiar, 2019). This desire to continue the learning journey past university is being driven by longer life expectancies, more diverse requisite career skills and frequent job changes driven by the previously discussed changing world of work. This has led learning to become increasingly work-integrated and more personal, accelerating the shift towards lifelong learning models (Deloitte, 2019). In recent decades, organizations have gradually realized that this shift in learning patterns provides workers with profound meaning both in and out of the workplace (ibid.). Specifically, the need for a lifelong learning culture in the workplace has been viewed as a top issue by 86 percent of business according to a Deloitte (2019) survey. This "learning into the flow of work and life" not only empowers individuals to actively develop new capabilities throughout their lifetime, but also drives a broader trend in the workplace to rethink approaches to learning, reskilling and personal capability development.

Nambiar (2019) states that this learning trend calls for new approaches to continuously create diverse capabilities to support individuals' timely skills acquisition in different disciplines during their continually changing working lives. Within this context, a continual lifetime training program utilising "micro-credentials" is proving

to be popular, with 71% of respondents stating they have taken micro-credentials to support their need for life-long learning (Stubbings, 2020)

3.3 COVID-19

The advent of COVID-19 has forced the online migration of universities due to the introduction of strict social distancing rules (Chen, 2020). This normalisation of digital learning has made the online model of micro-credentials a legitimate alternative in augmenting the skill sets of workers and students, which has been attributed to accelerating the popularity of micro-credentials during COVID-19.

COVID-19 has also forced the closure of key industries such as tourism, hospitality and retail, leading many individuals previously employed in these industries to look for opportunities elsewhere. This desire to upskill/retrain in order to find new employment has been important in driving the popularity of micro-credentials in Australia, with 12% of respondents to the Candlefox (Blazevic, 2020) COVID-educational survey stating that they have chosen to undertake micro-credentialing courses in order to make a career change because of COVID-19.

The pandemic has also resulted in 3.5 million Australians currently being supported by the federal government's 'JobKeeper' programme. According to Blazevic (2020), 38% of respondents have stated that they have turned to micro-credentials due to having more time available because of the pandemic, with these short qualifications providing a vehicle to improve their skill set in order to gain future employment.

The pandemic has also accelerated the profound and fundamental changes that technological innovation had incited in changing the world of work, particularly in the form of automation. In Australia, Davidson (2020) reports that COVID-19 has accelerated the movement of organisations towards automation, resulting in the loss of 2.7 million jobs by 2034. This movement towards a more automated economy and the threat of job losses has made 16.6% of respondents to turn to micro-credentials in order to upskill. Micro-credentials should be seen as a financially attractive

opportunity as part of the augmentation and reformation of the current model of university education (Thatcher, et. al., 2020). Along with their relative affordability, micro-credentials also offer a well-developed model of online education that has been completely unaffected by the sweeping changes necessitated by the pandemic. Micro-credential courses bring a level of familiarity to the online delivery mode that could be beneficial to offsetting the 'significant dysfunctionality and disturbance' (Watermeyer, et. al., 2020, p. 1) experienced by students as well as providers of HE embroiled in the process of online migration.

3.2 Survey Review

3.2.1 Respondent background information

The purpose of the survey was to understand the views of current students regarding the current HE sector and micro-credentialing. The survey was conducted online via Google Forms ("The Rise of Micro-Credentials", 2020). The survey was completed by 34 individuals selected via convenience sampling over a week-long period. The majority of respondents were undergraduates (91.2%), aged 18 to 24 and studying across all faculties (see Figure 4). When asked if they were familiar with micro-credentials, 79.4% of respondents (n=27) answered they were, reflecting trends identified in literature that indicated the increasing popularity of these courses in recent years (see Figure 5). This also reflects the number of respondents who stated they viewed micro-credentials as a way to supplement their university education

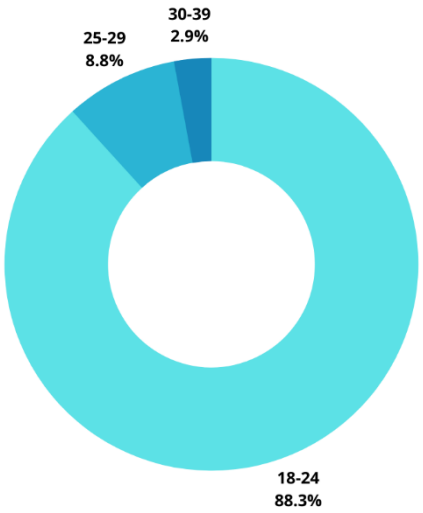


Figure 4: *Age distribution of number of survey respondents (n=34)*

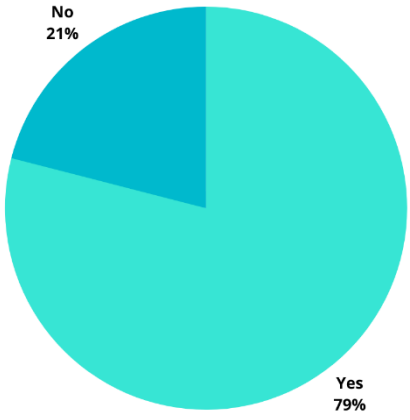


Figure 5: *Responses to the question "Are you familiar with the concept of micro-credentials?" (n=34)*

3.2.2 Thoughts on the role of university & micro-credentials

73.5% respondents stated that their primary reason for choosing university education was wanting to expand

career opportunities through recognised acquisition of skills (see Figure 6). This finding reflects the new paradigm of university education as a platform for both the attainment of knowledge and the development of the professional skills needed to thrive in the workforce. It also reflects the importance of the current university system in conferring legitimacy to skills. When asked on the role of micro-credentials, 79.4% of respondents stated that they viewed micro-credentials as a way to supplement their university degree, not as a replacement (see Figure 7). This contradicts the current dogma within elements of the educational community which claim that students are starting to view micro-credentials as a legitimate alternative to universities (Horton, 2020).

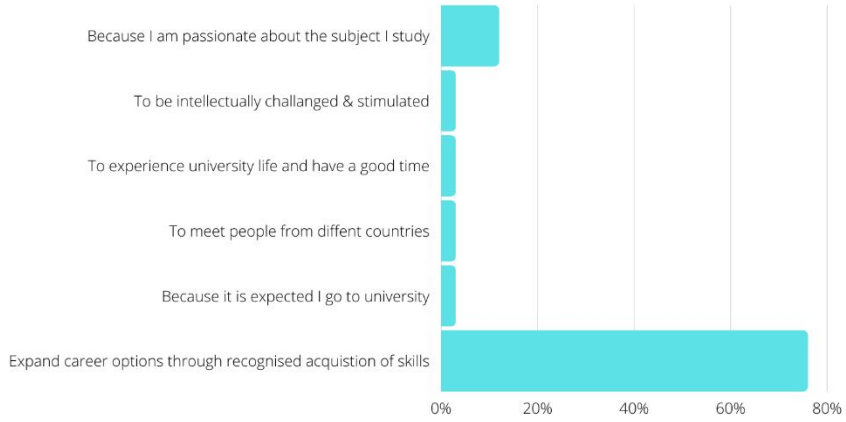


***Figure 6**: Responses to the question "Why did you choose to go to University?" (n=34)*

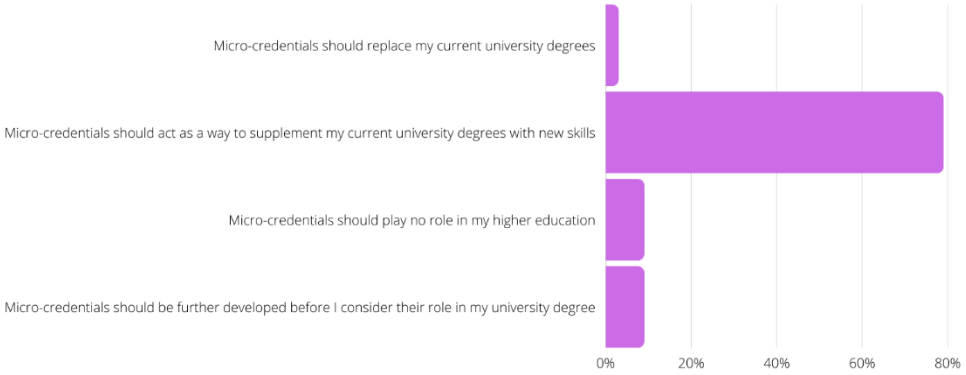


***Figure 7**: Responses to the question "What do you consider the role of micro-credentials in HE?" (n=34)*

3.2.3 Student insights into the micro-credentialing industry

A series of questions were designed to assess the views of respondents on micro-credentialing. Of the 27 respondents familiar with micro-credentials, 77.7% answered that they have undertaken a micro-credentialing course in the past 12 months (see Figure 8). When asked what the main reason was for completing micro-credentials; 66.6% answered that it was because they wanted to expand the skills needed for the workforce (See Figure 9). Interestingly, a significant minority of respondents stated uncertainty regarding COVID-19 was a main motivator in encouraging them to undertake micro-credentialing courses. It was also interesting that no respondents stated the ability to 'stack' degrees as being a reason for doing micro-credentials, again reflecting the notion that students in Australia want micro-credentials to supplement their degrees, not replace them. The majority of respondents also selected that the chosen micro-credential they had completed were in the fields of computer science, further reflecting the notion identified in the literature review that the changing world of work is an important trend driving the popularity of micro-credentials (see Figure 10). Interestingly, when asked what the most significant downside of micro-credentials were, 77.7% of respondents stated it was the inability to have their micro-credentials formally accredited and recognised by employers (See Figure 11). This identifies a key short-coming in the micro-credentialing system of Australia that has not been addressed.

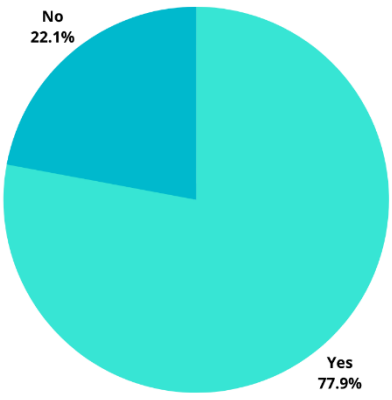


Figure 8: *Responses to the question "Have you undertaken a micro-credentialing course in the last 12 months?" (n=27)*

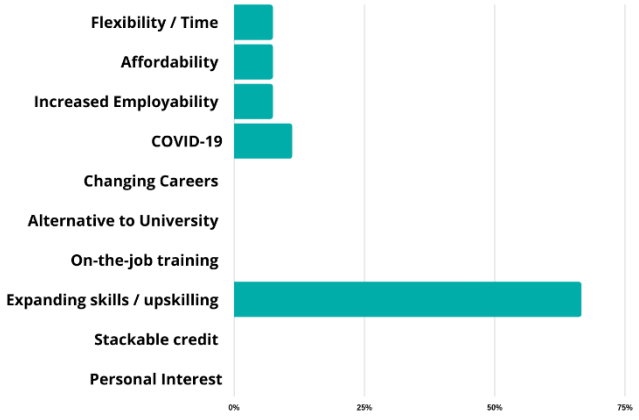


Figure 9: *Responses to question "what informed your decision to undertake a micro-credentialing course? (n = 27)*

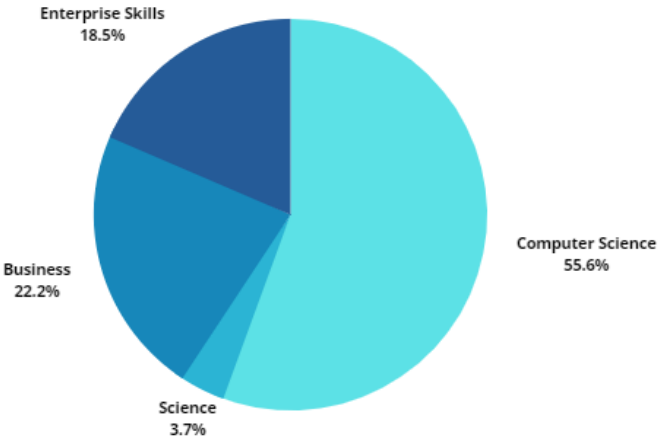


***Figure 10**: Responses to question "what type of micro-credential course did you select"? (n = 27)*

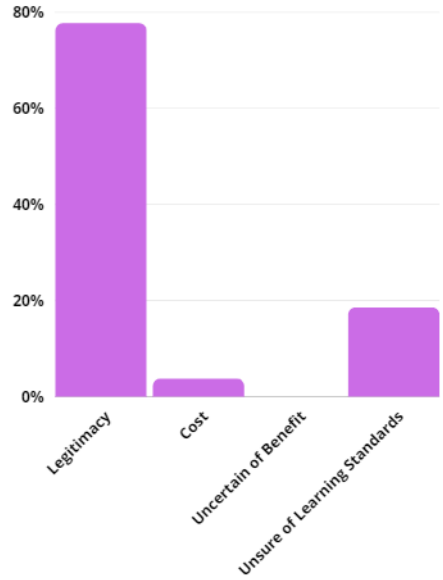
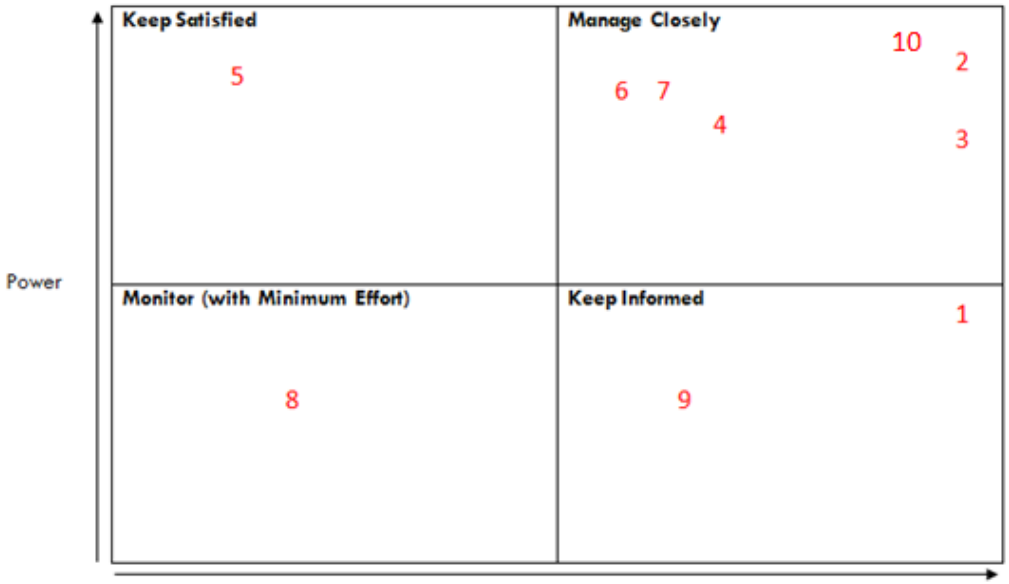


***Figure 11:** Responses to question "In your opinion, what is the most significant downside to micro-credentials currently?" (n = 27)*

3.3 Stakeholder Analysis

A stakeholder analysis was undertaken to determine the key participants with a vested interest in micro-credentialling, grouped on a matrix based on their power and interest, respectively (Fletcher et al., 2003)



***Matrix 1:** Stakeholder analysis matrix. X axis: stakeholder level of interest. Y axis: power of stakeholders in the HE sector.*

Stakeholder	Action	Description	Justification
1. Students	Keep Informed	Undergraduate and postgraduate students. These individuals will be undertaking the micro-credentialing courses at University.	As the individuals taking part in these courses, it is crucial to keep them informed due to the high interest and the reasonably high power they have on the success of this project.
2.Project team members	Manage Closely	Individuals who actively work on the execution and delivery of micro-credentialing courses.	These individuals are responsible for the design of this project, supervising and actively ensuring that all aspects of the project are going as planned, including the management of risks.
3.Current Employees	Manage Closely	Individuals who are looking to engage in life-long learning	Similar to students, these individuals are interested in undertaking micro-credential courses, but with more financial capability, granting them high power and interest in the implementation of proposed recommendations. These individuals are looking to increase employability by upskilling and/or attaining the relevant skills to remain employable in the post-COVID-19 economy.
4. University	Manage Closely	Teaching staff and campus operation and management staff.	Working together with the project team members, these individuals are critical to the delivery of these courses to students. They are responsible for the indication of the feasibility and practicality of

			this project (e.g. technical issues, content to be delivered, etc.) Thus, they have high power and interest in the implementation of micro-credentialing at University.
5. The Government	Keep Satisfied	The Australian Government	Responsible for the collection of taxes from the University and its employees. This translates to low interest in the project, but high power in terms of the success of the project.
6.Offline Educational Service Providers and Institutions	Manage Closely	Other universities, TAFE, high schools, foundation programs, etc.	Serving as a group of main competitors, they individually have their own reputation and ways to deliver education. Thus, it is essential to manage these groups closely in order to avoid the failure of this project.
7.Online Education Providers	Manage Closely	edX, Coursera, etc.	Serving as another group of main competitors, they have the advantage of delivering education online, which adds efficiency and accessibility to their service offering.
8.External Community	Monitor (with Minimum Effort)	Australian residents	Residents of Australia serve as potential future clients. As of now, they should be monitored with minimum effort due to their low power and interest in the project.
9.Workplace Employers	Keep Informed	Employers of companies	Company employers play a critical role in the students' lives during and/or after University. Thus, they should be kept informed.

10. Accenture	Manage Closely	A global and multinational professional services company.	The strength of Accenture's educational consulting division in Australia and their connections in business, government and education make them the ideal facilitator for the implementation of proposed recommendations on a national level. Hence, Accenture has high power and interest in the integration of micro-credentials in HE.

4. Recommendation

As previously discussed in our results, a number of key factors are contributing to the popularity of micro-credentialing as a supplement to the current paradigm of Australian HE. Specifically, our primary and secondary research has indicated that the changing world of work, the emerging popularity of life-long learning and the acceleration of technological innovation due to the COVID-19 pandemic are key trends relevant in driving the emergence of the micro-credentials. The results of our survey validated these secondary results by identifying (broadly) the key factor driving university students to participate in micro-credentialing; the acquisition of knowledge and skills. However, the results of our survey have also indicated that 77.7% of respondents felt strongly that a codified system for the accreditation of micro-credentials in Australia was needed. Based on these results, our group has formulated a comprehensive, multi-layered recommendation to help Australian universities take advantage of the growing popularity of micro-credentialing whilst addressing the lack of formal accreditation in the current micro-credentialing system.

Based on this analysis, we recommend that Accenture should develop an exclusive accreditation framework for micro-credentials issued by Australian Universities to

take advantage of the trends in life-long learning and the changing world of work that have been accelerated by COVID-19.

This recommendation is based on the results of our primary survey data, in which respondents stated they viewed micro-credentials as supplementary accreditations to 'augment' either their current or past qualifications. These respondents did not view micro-credentials, as some whitepapers in the United States tend to suggest, as a 'replacement' for the current 'degree'-based paradigm of Australian HE (Marcus, 2020). Our recommendation instead provides a path for stakeholders, such as students and life-long learners, to gain accreditation for micro-credentials, which they are currently completing without accreditation, to be accredited within a formally recognised and respected system.

Specifically, we recommend that micro-credentials are formally incorporated into the existing Australia Qualifications Framework (AQF) which stipulates the criteria for accrediting qualifications in Australia. The current AQF framework consists of 10 levels, ranging from a certificate I to a doctoral degree. The current levels of accreditation are defined based on the criteria of knowledge, skills and the volume of learning. For bachelor's degrees & higher, the AQF framework recommends that these courses be broken down into smaller 'units of study' which requires the achievement of specific learning outcomes. It is important to note that the role of the AQF is to set qualification terms, with the independent Tertiary Education Quality and Standards Agency (TEQSA) responsible for deciding which universities can accredit qualifications.

Level	The Current AQF	Proposed Parallel Micro-credentials
10	**Doctorate**	N/A
9	**Masters**	N/A
8	**Honours**	N/A
7	**Bachelor** *Knowledge: technical / theoretical knowledge with depth in one or more disciplines* *Skills: Skills to analyse information to complete a range of activities* *VOL: 3- 4 years (3 months per UOS)*	**Bachelor level micro-credential** *Knowledge: technical / theoretical knowledge with depth in one or more disciplines* *Skills: Skills to analyse information to complete a range of activities* *VOL: ~40-100 hours / UOS*
6	**Adv. Diploma** *Knowledge: technical / theoretical knowledge in a specific area* *Skills: Skills to analyse information to complete a range of activities* *VOL: 1- 2 years*	**Adv. Diploma level micro-credential** *Knowledge: technical / theoretical knowledge in a specific area* *Skills: Skills to analyse information to complete a range of activities* *VOL: ~160 hours*
5	**Diploma** *Knowledge: technical knowledge in a specific area* *Skills: Skills to complete routine and non-routine activities* *VOL: 1- 2 years*	**Diploma level micro-credential** *Knowledge: technical knowledge in a specific area* *Skills: Skills to complete routine and non-routine activities* *VOL: ~80-160 hours*
4	**Cert IV** *Knowledge: broad factual knowledge of specific area* *Skills: Skills to complete routine and non-routine activities* *VOL: 1 year*	**Cert IV level micro-credential** *Knowledge: broad factual knowledge of specific area* *Skills: Skills to complete routine and non-routine activities* *VOL: ~40 – 80 hours*
3	**Cert III** *Knowledge: Basic theoretical knowledge of specific area* *Skills: Skills to complete routine activities* *VOL: 1 year*	**Cert III level micro-credential** *Knowledge: Basic theoretical knowledge of specific area* *Skills: Skills to complete routine activities* *VOL: ~40 – 80 hours*
2	**Cert II** *Knowledge: Basic factual knowledge in defined area* *Skills: Basic skills to undertake defined activities* *VOL: 0.5 years*	**Cert II level micro-credential** *Knowledge: Basic in defined area* *Skills: Basic skills to undertake defined activities* *VOL: ~10-40 hours*
1	**Cert I** *Knowledge: Foundational knowledge in narrow area* *Skills: Basic skills to participate in everyday life* *VOL: 0.5 years*	**Cert I level micro-credential** *Knowledge: Foundational* *Skills: Basic skills to participate in everyday life* *VOL: ~10 hours*

***Figure 12**: Under our proposed augmentation to the AQF framework, micro-credentials will be classified based on the existing AQF criteria of knowledge, skills and volume of learning (VOL). This allows for the difficulty and content of micro-credentials to be determined against respected industry standards. This allows for micro-credentials issued by Australian Universities to be accredited based on the existing taxonomy. Given the differences in the VOL, micro-credentials will be worth less than normal degrees. We propose that the credits awarded to micro-credentials are proportional to the VOL of current courses. The system does not apply to AQF qualifications above and including honours, as it is infeasible that micro-credentials could offer the same level of teaching as advanced educational qualifications.*

Micro-credentials, which are shorter in duration than conventional certificates and degrees, will be accommodated in the current framework parallel to the existing taxonomy used to rank qualifications based on skills and knowledge. The parallel nature of the framework means that the knowledge and skills contained in a specific micro-credentials can be recognised based on the existing criteria used to determine a course's level of qualification.

The main differentiator between the traditional qualifications and micro-credentials in our proposal is that micro-credentials accredited under this system will be worth less than a traditional qualification of the same level. This is because the volume of learning, defined as the duration and activities needed to attain a qualification, is significantly less for a micro-credential than for a traditional qualification. This will mean that a micro-credential, whilst being accredited based on the current framework, will be worth less than a traditional diploma, certificate or bachelor's degree unit of study. This is to discourage the process of 'stacking' micro-credentials to a level equivalent to a normal degree, which would harm the current HE system. We also stress that the results of our primary data show that respondents are not looking to 'stack' degrees but to augment their traditional education with accredited micro-credentials that will be valued by businesses.

Micro-credentials in this expanded AQF framework will be exclusively certified by institutions accredited by TEQSA. This acts as a quality control mechanism by ensuring that all micro-credentials that qualify for the new framework meet a minimum standard of teaching that can only be offered by universities. This also makes micro-credentials dispensed by Australian Universities unique amongst most international and domestic rivals in that each micro-credential will be able to be accredited using a nationally recognised framework.

The structure, content and assessment of the micro-credentials will be developed by universities. However, these micro-credentials must be submitted to the AQF to be verified and classified at the appropriate level based on knowledge and skills provided (See Figure 13). Specifically, all micro-credentials must meet a minimum standard of skill and knowledge in order to be credentialed. We propose to base this minimum standard on an augmented version of the EMC Common Micro-Credential Framework (see Figure 14). If the micro-credentials meet the specified learning outcomes of their

associated level, then the AQF and TEQSA will be able to certify the course and the institution as a legitimate provider of accredited micro-credentials.

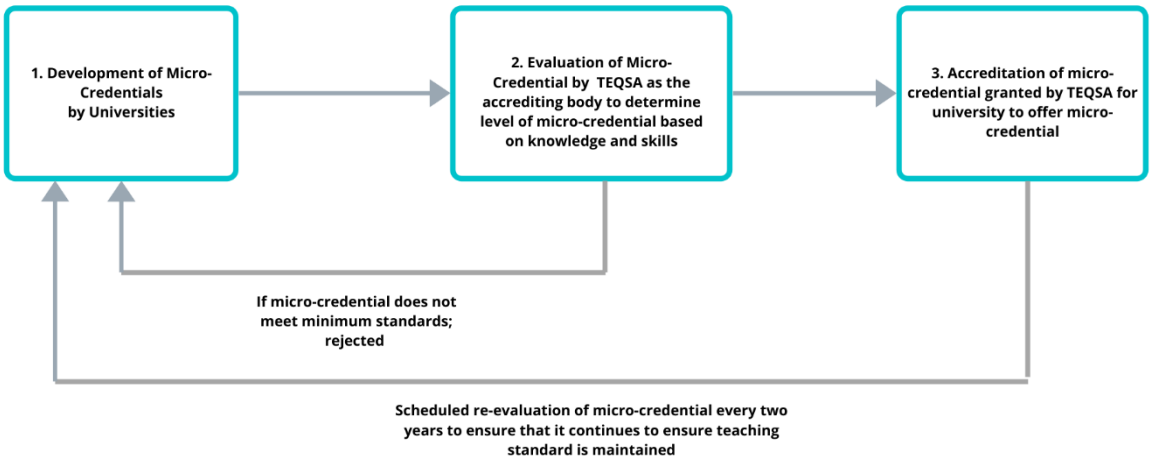


Figure 13: *Proposed process for universities to submit micro-credentials for accreditation. Micro-credentials will be submitted to TESQA as the regulator of Australian universities. If micro-credentials do not meet the minimum standards as listed in figure 14, then they will be rejected. To ensure the quality of teaching, micro-credentials will be reviewed every two years.*

Figure 14*: Proposed minimum micro-credential guidelines, based on the EMC Common Micro-Credential Framework (AQF, 2019).*

The verification of these qualifications, in the form of a digitised transcript, is also important to our accreditation framework. Specifically, we propose that blockchain technology be leveraged to create a verifiable 'life-long learning-pass' application based on the Singapore Government's 'Skills Passport' system (Sagar, 2019). The storage of educational attainment data in codified, immutable 'blocks' that are stored on a public ledger administered by Accenture would provide a verifiable record of micro-credential accreditation. This would permit the educational attainment of individuals through micro-credentials to be easily verified by both employers and other universities whilst ensuring the highest standards of data privacy and security (see Figure 15).

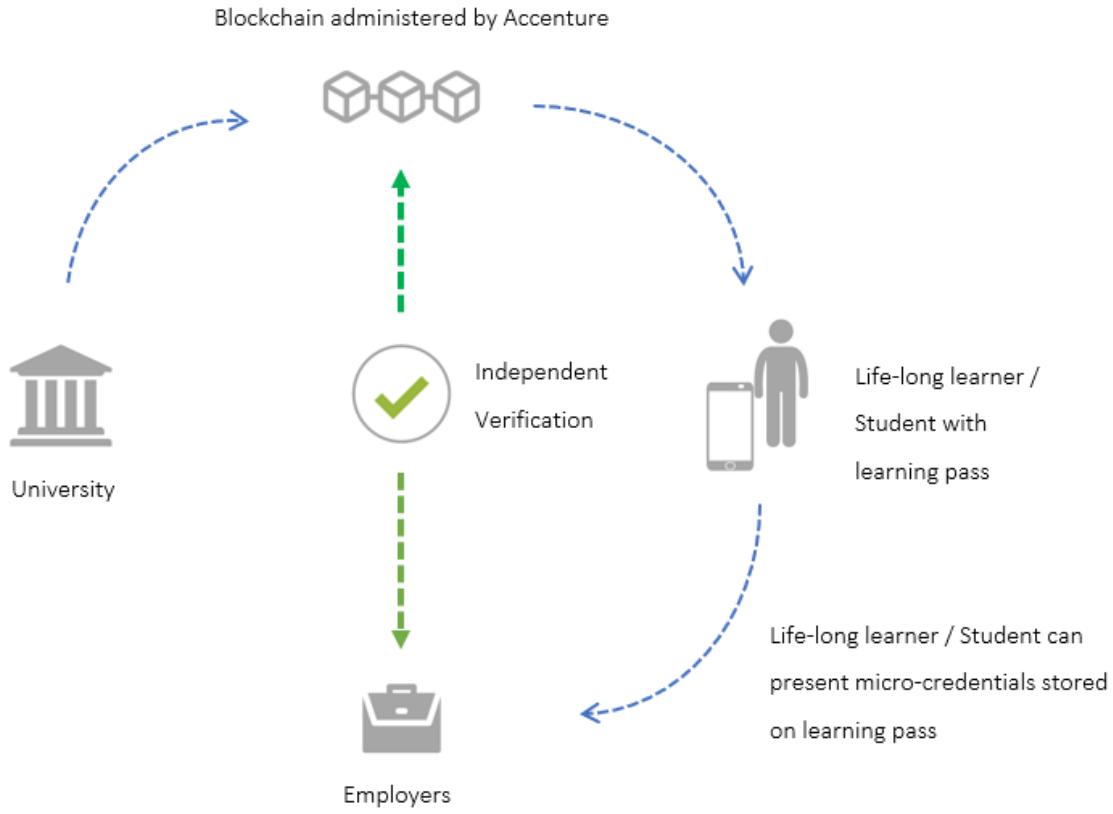


***Figure 15**: Proposed blockchain verification system involves universities verifying and submitting accredited micro-credentials in an 'immutable' format to a blockchain server run by Accenture. Students and life-long learners can access their accredited micro-credentials through a website, which is publicly available. The individual can then present their accredited micro-credentials to potential employers, who can independently verify the accreditation of the micro-credential on the public blockchain.*

4.1 Critical Evaluation

The implementation of this recommendation presents a number of benefits to four key stakeholders previously identified in the stakeholder analysis: government, universities, students & Accenture.

4.1.1 Business

Our recommendation benefits business by providing a framework that allows for micro-credentials accredited by Australian universities to be formally credentialed within the existing AQF framework. This allows businesses to quantify the value of micro-credentials based on skills and knowledge, therefore increasing the value of these qualifications. This addresses a major point of contention discovered in the results of our primary survey in which respondents lamented that current micro-credentials lacked the appropriate accreditation. The use of a blockchain 'skill passport' system to verify the legitimacy of the accredited micro-credentials helps to reduce the expense of onboarding new employees by reducing the investment needed to verify the legitimacy of the qualification.

4.1.2 Universities

As the central focus of our problem statement, universities are the main beneficiaries of our recommendation. By positioning Australian universities as the sole providers of accredited micro-credentials within the existing AQF system, the HE sector is poised to take advantage of the increased desire for life-long learning accelerated by the changing world of work. Our recommendation would open a lucrative revenue stream for universities by attracting the hundreds of thousands of individuals looking to upskill in preparation for a more automated work environment post COVID-19. Specifically, the uniqueness of having a formal accreditation system that is integrated with the internationally recognised AQF system positions micro-credentials from Australian universities in a unique position of being recognised internationally. It will also help Australian universities to establish a coherent continuum of learning whereby students can continue their learning journey long after graduation by using micro-credentials administered by their alma mater to keep up to date in their original area of study as well as adding skills in other areas. This would present universities as the 'chosen' life-long partner of the student by providing multiple, fully-accredited units of study in a way that suits the changing life circumstances of the student. The use of a blockchain-

based skills passport would also reduce instances of qualification fraud, which ensures the value of the qualification is not diminished.

4.1.3 Students / Life-long learners

Our recommendation would allow students and life-long learners to gain micro-credentials that count as accredited qualifications. This will increase the value of micro-credentials by allowing students to officially validate the skills they have acquired through micro-credentials, increasing their future employability. It will also mean that students will be able to augment their current university level qualification with micro-credentials. The use of a digital passport based on blockchain technology to validate micro-credential qualifications will assist students in accelerating the onboarding process with new employers.

4.1.4 Accenture

The recommendation would place Accenture in the ideal position of coordinating this project for Universities Australia by leveraging their global experience in educational consulting, technology and marketing. The addition of a blockchain verification system to create a 'digital passport' for lifelong learning would also allow Accenture to leverage their experience in blockchain technology. This would be financially rewarding for Accenture as it would receive a substantial government contract to develop and maintain the blockchain accreditation network for micro-credentials. It would also allow the company to test applications for blockchain technology, keeping Accenture at the forefront of this space.

4.2 Feasibility & Implementation

Our recommendation is highly feasible and can be achieved by Accenture. As our recommendation proposes an extension of the existing AQF accreditation system and criteria to cover micro-credentials, there is no need to develop an entirely new framework. This results in significant monetary and time savings for the organisation. Furthermore, as a market leader in the development of blockchain-based applications, Accenture can leverage its experience in using blockchain as a verification tool, as part of its 'WEF Known Traveller Digital ID' programme, to develop a skills passport that verifies micro-credentials.

The implementation of the proposed framework should be facilitated through cooperation with the newly announced AQF governance body. This governing body was recommended as part of the 2019 AQF review and accepted by the Federal government on the 9th December 2019 (Noonan et al., 2019). The purpose of this body is to implement changes announced in the 2019 AQF review and to oversee additional reforms if needed. This governance body includes representation from key stakeholders such as government, universities and business. Accenture should cooperate with the AQF governance body in the form of a technical working group to suggest this recommendation be implemented as part of the ongoing process of reform (see Figure 16 for process).

***Figure 16**: Accenture should look to operate within the current AQF implementation timetable over a two-year period. This implementation timetable includes the development of governance and guidelines, the drafting and consultation of these guidelines and the development of specific industry communication leading to a revised AQF framework. This is followed by the development of legislation and finally the transition to the new AQF framework. We recommend that to implement our proposed recommendation, Accenture presents the proposal for the parallel framework and blockchain verification system during the consultation phase of the AQF process, further developing the legislation and the structure needed to implement the recommendation into the AQF framework (AQF, 2019)*

4.3 Limitations

Whilst our proposal aims to provide a comprehensive methodology, there exists a series of limitations inherent to any recommendation associated with large structural change.

4.3.1 Exclusion of private non-university micro-credential providers

A key limitation of our recommendation is the purposeful exclusion of private, non-university providers from our proposed accreditation system. However, it should be noted that the decision to exclude private and industry micro-credential providers from a prospective AQF accreditation framework was done intentionally. The purpose of this deliberate omission is to ensure that only micro-credentials provided by Australian universities can benefit from our new framework. This ensures that Australian universities will become the main beneficiaries of the increased trends towards micro-credentialing. This will ensure that the university sector will remain relevant and financially prosperous going into the future.

4.3.2 Aggregating qualifications from multiple providers into a single degree

A key limitation of our recommendation is that the proposed framework does not explicitly address the issue of how to stack micro-credentials from multiple providers into a single qualification. This omission was due to the results of our primary research survey which indicated that the ‘stacking’ of micro-credentials to create an equivalent ‘bachelor's degree’ was not a popular idea amongst Australian students. Specifically, if an individual stacks multiple micro-credentials from different universities into a single degree, this raises questions as to which university is responsible for accrediting the degree? This is a limitation to our proposed framework and will require collaboration with Universities Australia as the industry body to develop a policy specific to this limitation. Potential solutions could be the implementation of policy guidelines outlining specific criteria governing which university is responsible for accrediting a degree consisting of stacked micro-credentials. For example, if enough micro-credentials are stacked to create an equivalent ‘bachelors' level degree, then this ‘degree’ could be accredited by Open Universities Australia as a third party.

5. Interdisciplinary Collaboration

The group was able to synthesize our diverse interdisciplinary skills, spanning the faculties of art, commerce and science, allowing us to approach issues relating to micro-credentials from a range of perspectives and experiences. This was especially important when dealing with an issue of this size and complexity. It was also important given that the future of Australian universities is a problem in which we have a vested interest. Utilising a truncated design thinking research methodology, we were able to 'blend an end-user focus with multidisciplinary collaboration and iterative improvement' (Nakano, et. al., 2018) to produce concrete yet innovative solutions.

Nevertheless, given the way we structured the task, which was an in-depth analysis of micro-credentials, we did find that this project was largely a qualitative one. Consequently, we did not perhaps utilise the full diverse range of disciplinary approaches, although we did try and include quantitative analysis when possible such as incorporating survey data. This did not inhibit our group's overall performance as it was clear that each team member still put forward their unique disciplinary view.

Whilst the legal aspect of our recommendation was not the central focus of this project, having a team member with a disciplinary background in law would have been beneficial in understanding the legal process and barriers to implementing our recommendations. For example, our recommendation entails limiting our parallel AQF micro-credentialing system solely to universities, at the exclusion of private providers, which may result in legal complications. Furthermore, having an member who had an accommodating approach (Kolb, 2013), who was high in terms of extraversion would have driven communication and the conversation in the initial stages of the project. Team bonding was inevitably more difficult with the unit being delivered in an online format but this issue was negligible as time went by and a psychological safe atmosphere bounded by trust was established (Duhigg, 2016).

6. Conclusion

The main recommendation presented in this report is that Accenture develop an exclusive accreditation system for micro-credentials issued by Australian Universities. Specifically, it is recommended that Accenture develop a system that is parallel to the current AQF qualification taxonomy. The expansion of the current qualification system for traditional credentials to include micro-credentials allows for these increasingly popular short courses to be formally accredited using the current AQF criteria. This means that micro-credentials can be accredited based on the skills and knowledge they confer by using the current criteria. It is also recommended that Accenture leverage their experience utilizing blockchain applications to develop an immutable system for the verification of micro-credentials administered by Australian universities.

This recommendation is significant as it provides an opportunity for Australian universities to capitalise on the increasing popularity of micro-credentials due to COVID-19. Specifically, this recommendation addresses the main concern of Australian students with respect to micro-credentials; that they are currently unaccredited. By allowing micro-credentials administered by Australian universities to be accredited based on the respected AQF framework, universities in this country will be able to attain a larger share of the micro-credential market due this distinct advantage. This provides Australian universities an advantage over private providers such as Cousera and Udemy, which do not offer formally accredited micro credentials.

Specifically, this recommendation has the potential to dramatically change the current practise of administering and assessing micro-credentials in Australia. By providing a formal system of accreditation that allows for companies and universities to formally assess the skills acquired through micro-credentials, the value of micro-credentials in the future Australian workforce will increase.

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Appendix

Term	Definition
AQF Taxonomy	The description and classification of Knowledge, Skills and Application across a number of bands or levels.
Band	A new term for a revised AQF to replace levels. Bands provide an indication of the relative complexity and/or depth of achievement and the Knowledge, Skills and Application required to demonstrate that achievement.
Domain	A grouping of the learning requirements of a qualification type. In the current AQF the domains are Knowledge, Skills and the Application of knowledge and skills. In the revised AQF the domains would be Knowledge, Skills and Application.
Descriptor	Terms that describe the Knowledge, Skills and Application features of bands and qualification types.
Focus Area	The themes within each domain that are described by descriptors. Examples of focus areas include information management and problem solving and decision making.
Level	Used in the current AQF, levels are an indication of the relative complexity and/or depth of achievement and the autonomy required to demonstrate that achievement. AQF level 1 has the lowest complexity and AQF level 10 has the highest complexity (AQF Glossary of Terminology).
Qualification	A formal certification, issued by a relevant approved body, to recognise that a person has achieved the intended learning outcomes or competencies.
Qualification Type	Refers to the broad discipline-free nomenclature used in the AQF to describe each category of AQF qualification (AQF Glossary of Terminology). Qualification types are inclusive of a variety of qualification designs, including curriculum-based qualifications, Training Packages and Accredited Courses.

Appendix 1: *National Qualifications Framework & AQF terms (AQF, 2019)*