

REINFORCING UNIVERSITY-BASED START-UP DEVELOPMENT THROUGH DIGITISATION: AN EVALUATION OF A SCOTTISH BUSINESS SCHOOL¹

Robert James Crammond ⁽¹⁾

⁽¹⁾ University of the West of Scotland, United Kingdom

Submission History

Received: 07-08-2025

Accepted: 08-10-2025

Published: 30-11-2025

Citation: Crammond, R. J. (2025). Reinforcing University-based Start-up Development through Digitisation: An evaluation of a Scottish business school. *Management in Review*, 3(1), 4-17. DOI: <https://doi.org/10.61282/mir.v3i1.31>

Abstract:

Through ideas, invention, and innovation enterprising behaviours evolve and respond to a multitude of societal and market demands. The recent COVID-19 pandemic witnessed financial instability amongst sectors, and global student recruitment crises has brought about a need to understand, use, and develop enterprising and digital skills. Towards this practical and pedagogical endeavour, this paper evaluates the digitised offering and institutional response from a team within a Scottish university. This involves an exploration of over 500 students enrolled in taught modules or enterprising activities such as competitions and external engagement. Feedback from students, concerning the support offered, opportunities to network and realise entrepreneurial potential, and the likelihood of business growth contribute towards recommendations. This includes (1) an illustration of factors which add to enterprise agendas which in turn support businesses through digital platforms and forums, and (2) a prescriptive 'four-stage model' of anticipated activity through teaching and support: information, organisation, digitisation, and acceleration. This paper crystallises and highlights the need for a unified approach, both pedagogically and culturally, to university-based start-up activity to effectively utilise digital methods of engagement and development.

Keywords: enterprise, entrepreneurship, education, start-ups, digitisation, business school, higher education, incubation

¹ **Copyright © 2025 The Author(s):** This is an open-access article distributed under the terms of the Creative Commons Attribution **4.0 International License (CC BY-NC 4.0)** which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

1. INTRODUCTION

Entrepreneurship is a multifaceted phenomenon which impacts all walks of life (McAdam *et al.*, 2016; Crammond, 2020; 2023; Valavanidis, 2020). It has the ability to positively change individuals, groups, societies, and nations. Through enterprising ideas, inspired invention, and push or pull innovation enterprising behaviours evolve with the demands of society and both national and international markets (Lamas and Lamas, 2022).

The increased promotion of entrepreneurship as a viable opportunity for individuals and groups to realise personal, professional, and economic ambitions permeates the processes and rhetoric of public and private organisations and educational establishments (Murray *et al.*, 2018; Crammond, 2020; 2023; Khan, 2022). The notions of creativity, innovation, and entrepreneurship are also regularly and positively stated by key stakeholders such as existing entrepreneurs, investors, researchers, and politicians (Cerqueira *et al.*, 2021; Crammond, 2023).

In essence, with over 90% of businesses within a country being a Small or Medium Enterprise (SME) who thrive from possessing an entrepreneurial mind-set, the state of economies are strengthened by the emergence and development of new businesses (start-ups) from several adaptable sectors (Ali *et al.*, 2022).

In supporting the entrepreneurial effort, the university environment, digital and physical, are vital in educating potential entrepreneurs, nurturing business ideas, and assisting in their initial start-up and its growth. It exists as a place of encouragement and enlightenment for people of all backgrounds, experiences, and career motivations (Maritz *et al.*, 2022; Crammond *et al.*, 2023).

Over the past half century, the subject of entrepreneurship has entered the classroom and led to a plethora of taught programmes across many modes of study (Crammond, 2020). These are hosted by business schools, engineering faculties, and contemporary departments specialising in the creative arts, social science, and sport sciences. This has further strengthened the view that entrepreneurship is firmly in the mainstream and at the forefront of the minds of visionaries within Higher Education (HE) (Heblich and Slavtchev, 2014; Alkhalaileh, 2021). Today, innovative universities have a global reach through mobilised digitisation and modernised channels of communication, combining international campus portfolios with online programmes as well as continuing to support and respond to local and regional needs (Crammond and Hyams-Ssekasi, 2024).

Furthermore, in recent times, there is increasing need for universities to engage with emerging and growing businesses through digital methods and enterprising platforms. These range from utilising online learning platforms such as Moodle™, Aula™, Blackboard™, and Google Classroom™ in facilitating distance and blended or hybrid learning. Or, adopting digital technologies and environments such as the metaverse and Artificial Intelligence (AI) which simulate business scenarios. These, along with the increasing use of timely social media interventions, add to the existing digital business necessities of maintaining effective information systems, analysing big data towards forecasting and subsequent decision making, engaging with consumers and other businesses within the network, and integrating an internet of things, where applicable, within business operations.

Whether through a need to adapt to advancing technology, or compete within the HE sector, universities now embrace digital tools to teach, support, and encourage enterprise amongst students (Crammond *et al.*, 2022). Concerning the start-up development process itself, digitised forms of idea generation processes using project management tools such as Trello™ or Mind-mapping such as Canva™, business planning (including business modelling through identified components), and market testing forecasting adopting theoretical frameworks and environmental scanning techniques.

This paper evaluates, through the perspective of post-pandemic and online-mode entrepreneurship education approaches, the digitally based design, delivery, and ongoing successes of the entrepreneurial offering from a team of business school academics and

professional support staff within a Scottish university in the west of Scotland. In ascertaining the impact of this offering on a sample of over 500 students enrolled in taught programmes or enterprising initiatives, this includes an exploratory analysis of a suite of online taught modules across both undergraduate and postgraduate levels, industry intervention through periodic external engagement and consultancy-based sessions, and a chronology of competitions where awards, funding, and opportunity to further develop business ideas can be gained.

In addition, and significantly, the offering includes digitally supported engagement, through dedicated and university-endorsed web spaces and communicative platforms, for knowledge exchange, market research, and both regional and national-level networking. Data analysed within this paper is in the form of course and activity feedback, from individual and groups developing a business idea or as an enrolled students within one or more formal courses from the suite of taught modules delivered virtually.

The paper discusses two distinct incentives for this institutional offering: (1) the enterprise-specific support structure in place for start-ups which is enhanced by virtual idea generative spaces, and (2) a facilitation of entrepreneurial opportunities for all students through phased, inclusive, and accessible online platforms which transcend originally selected programmes of study upon enrolment. As a result, constructive entrepreneurial outcomes and distinct start-up relevant interdisciplinary skills are witnessed as a product of a reinforced, entrepreneurial culture that are digitally embedded within the institution and span faculties.

Included in this paper is a discussion of the entrepreneurial university, advancing literature on the subject of entrepreneurship education and digital education, and digital teaching and support approaches for start-up creation. The following sections present the context of the study, a rationale of the methodological approach and the exploratory method adopted, and an analysis of the enterprise-focussed offerings within the investigated university. Later sections thematically appreciate and conceptualise the findings, informing a theorisation of digitally-assisted start-up education and support pedagogy as well as highlighting the efficacy of utilising existing support structures and mentoring mechanisms within HE. Recommendations, via a four-stage model, for educators, researchers, and practitioners close the paper.

2. THEORETICAL SUPPORT

Universities are many things to many people. They are a gateway to a better life, as students embark on a new career by attaining necessary qualifications. They also act as problem solvers, and hubs of creativity and innovation for all walks of life.

University-based start-up and incubation research has been notable since the 1990s, and proliferated from the millennium (McAdam *et al.*, 2016; Crammond, 2020; 2023). The early 2000s witnessed the start of accelerators within the enterprise network (Pauwels *et al.*, 2016; Rippa and Secundo, 2019)

Amongst other recent studies, Ali *et al.* (2022) highlight the importance of business incubation and the subsequent promotion of entrepreneurial strategies that arise from university incubators. Not only do incubators have the ability to fulfil personal and professional ambitions, they also instigate teamwork and legacy-building towards a unified goal of societal and industry value. Related theories such as human and intellectual capital, within enterprising environments (Crammond, 2024; 2025), state the link between increased exposure to incubator spaces and the proclivity towards creativity and innovative actions.

Unfortunately, accessing start-up support and realising entrepreneurial potential through productive activity can be impacted by the location of students and HE institutions alike, programmes available and selected for study, and present funding infrastructures. This limits the rate at which start-ups can be established and progressed and presents a variety of problems for the national outlook for enterprise, leading to challenges concerning ecosystem efforts and overarching economic objectives. These include: (1) cost or access barriers for individuals, groups,

and institutions interested in entrepreneurship; (2) Unrealised or missed potential amongst nascent entrepreneur communities; (3) maintenance of poor start-up survival rates with an ailing start-up landscape within regions; and (4) the continuation of longstanding weak networks including limited or non-existent collaboration.

2.1 THE ROLE OF THE INSTITUTION

University-based entrepreneurship education and support has resulted in entrepreneurial activity, including start-ups, being diverse in nature, sector, and ownership (Shah and Pahnke, 2014).

Entrepreneurial universities, in seeking partnerships, evidencing impact, and consistent levels of financial reward, now collaborate more closely with industry, local and national government, and groups who focus on societal and environmental concerns (Maritz *et al.*, 2022).

Bist (2023) notes that the economic aims across the triple helix for nations are partly satisfied by a future workforce who can create and grow businesses in the digital or physical marketplace. Heblich and Slavtchev (2014) note that social awareness and engagement across stakeholder groups are also fundamentally needed, alongside convenient access to university spaces and expertise, to boost start-up rates and define their beneficial and valuable intentions.

McAdam *et al.* (2016) appreciate the many stakeholders involved in the incubation process, including a fourth member, the end user, going beyond the commonly referred to triple helix of universities, government, and industry.

Moving forward, evidence suggests that organisations who originate from university incubation benefit from being, and aim to be, close to the university in attaining future opportunities (Soetanto and van Geenhuizen, 2019).

2.2 SUPPORT AND STRUCTURE

University incubators provide a range of services, including expertise, supportive departments across education, training, and business process but also physical space to discuss and critique ideas and progress (Ali *et al.*, 2022). Mankevich and Holmström (2016) define incubators as places of development, from idea generation to commercialisation, which are now accommodating online business and digital entrepreneurs. They also define digital entrepreneurship as a place where new digital ventures, and their ideas, can be explored, tested, developed, and prepared for entrepreneurial futures. Incubators, digital or otherwise, instil a formal and phased approach to start-up or spin-out development within the university, such as:

1. Conducting online business research – *search engine and reviewing publicly-available records*
2. Market awareness and forecasting – *business simulation and serious gaming*
3. Organisational planning and organisation – *mind-mapping and project management via products such as Trello or Canva*
4. Periodic communication recording and online meetings – *Teams™, Zoom™, Google Meet™, for example*
5. Market testing – *social media and simultaneous consumer engagement*
6. Product development – *prototyping, architectural design, or 3D printing technologies*

Successful incubator integration can be varied and uncertain across the sector, with all being subject to some degree, to many constraints (Maritz *et al.*, 2022). Taught courses and programmes are still central towards building university-based start-up development infrastructure. Murray *et al.* (2018) acknowledge the development of entrepreneurship education, through its plethora of many forms, towards multiple programmes which include blended, hybrid or distance learning.

Teaching and support are vital, when considering the production, presentation, and positioning of forms of entrepreneurship education and surrounding activities (Crammond, 2020). Entrepreneurship education comprises a variety of formative and summative methods, transcending business plan and presentation approaches to case study scenario analysis, and product testing and innovation (Crammond *et al.*, 2023; Crammond, 2024).

2.3 DIGITAL DIMENSIONS FOR ENTERPRISE

To digitise is to modernise and expand into new regions and markets (Cerqueira *et al.*, 2021). With the increasing use of the internet, virtual platforms, and now advancing simulations such as the metaverse, start-ups can now better understand the contexts and scenarios which their business has been, or will be, exposed to. Digitisation has seen a proliferation of research investigation and discussion concerning its impact on many aspects of business operations: creativity, logistics, marketing, and entrepreneurship (Lamas *et al.*, 2020).

Digital entrepreneurship is yet another helpful route towards entrepreneurship, as a taught, researched, and practiced subject, responding to social and sustainable development concerns (Lamas and Lamas, 2022). Digital entrepreneurship comes in many forms, including e-commerce, unique branding and digital marketing, mass market advertising, webpage and app development, commercialisation, and programmatic approaches to digital education for business and organisational growth (Khan, 2022).

University incubators, and the advent of digital entrepreneurship, further increases the rate of academic spinoff activity (Stagars and Stagars, 2015; Sansone *et al.*, 2021). Universities are now responding to a digital revolution, which includes digital transformation of systems and modes of communication, AI, automated technologies, and robotics (Valavanidis, 2020). The use of social media in the past 15 years has resulted in a business's instantaneous engagement with consumers, competitors, and society in general (Crammond *et al.*, 2018).

Digital competences and widened reach result in new, unique selling points and valuable propositions from the digital business context (Saavedra *et al.*, 2020).

Lamas and do Amaral Pereira (2022) point out the necessity of the digital transformation of businesses in order to survive, let alone thrive, amidst continued globalisation and increased digitisation. Alkhalaileh (2021) also notes that the role of digitisation within universities, as a method to engage with business and enterprise study, increases self-efficacy and intention towards entrepreneurialism.

Mörke and Swensson (2020) recognise the role of digital tools, including social media, in publicising the impact and level of support that incubators have. Working together with other organisations and towards an agreed goal, incubators build trust and gain increasing validity upon evidencing their successes and societal contributions.

Many international studies discuss the role of digitisation towards college and university start-ups (Bist, 2023). The existence of a digital dimension, and its applicable platforms, to current businesses, allows entrepreneurs and owners to effectively and efficiently address all aspects of their operations from idea generation to productivity and financing, to marketing and engagement with the end user (Nassar and Malik, 2022). A business that is digitally transformed, can grow through its exposure and in keeping with market trends, as well as engage in real time with consumers (OECD, 2019).

Developing digital competences within start-ups is a necessary and natural progression from the technological connotations discussed within existing start-up and new venture creation literature. The team-based approach, whereby educator personality and perspectives towards digital education tools, as well as instilling industry-relevant interventions, increases meaningful enterprising outcomes (Crammond *et al.*, 2023).

A recent case study involving a cohort of students highlighted that quality teaching and impactful learning was evident as the combination of intellectual capacity, a unified goal, a present enterprise ecosystem, and the motivation to succeed being identified as key ingredients towards digital forms of entrepreneurship education and support within universities (Crammond *et al.*, 2022).

Students, through regular exposure to enterprise via the several platforms and virtual environments are witnessing distinct, entrepreneurial traits and positively react to entrepreneurial activity within formal courses or informal university activities and events.

As discussed within my recent book, entrepreneurship within universities must be able to flourish through a combination of time, talent, and technique (Crammond, 2023). The latter element here, technique, refers to this transferability of digital skills in strengthening business ideas. Being digital and being entrepreneurial can mean that you are creative and innovative but realising value through its implementation and marketisation is important for start-ups (Knickrehm *et al.*, 2016). The results of timely and productive digital transformation and digital education on developing start-ups are the forming of prepared, agile, and innovative businesses (Crammond, 2020; Valavanidis, 2020).

3. METHODOLOGY

However, with recent years of increased off-campus activity due to the COVID-19 pandemic, and a desire to 'digitise' educational offerings in order to compete within the volatile HE sector, a part-solution has been found with universities pivoting their operations towards programmes, support, and research to be facilitated and communicated online. This has also included the enterprise offering, from entrepreneurial universities with in-house incubator and accelerator facilities (Murray *et al.*, 2018; Crammond, 2020; 2023; Crammond *et al.*, 2023). Particularly noted, is the need to introduce digital tools and processes to complement start-up phases from idea generation (information), organisation (managing), formulation (digitisation), and execution (incubation to acceleration).

Institutions who present enterprise and entrepreneurship activity as inclusive, accessible, and meaningful within university education, raise entrepreneurial intentions and promote positive connotations associated with new venture creation (Murray and Crammond, 2020). This leads to a correlation between positive perceptions of entrepreneurship and increased proclivities towards business start-up creation and development.

The example presented in this paper concerns online-based activities involving a sample of over 500 students within a business school in a university, in the west of Scotland. This sample was investigated during the academic sessions of 2020/2021 and 2021/2022. Table 1 lists the many examples of the enterprise offering at the University of the West of Scotland (UWS), digital or not,

Table 1: Snapshot Enterprise Offering

Learning	Research	Business Development & Incubation	Engagement	External Opportunities
Entrepreneurial Opportunities and Market Scanning	Enterprise Research Group	<i>UWS Incubator</i>	Help to Grow	Alumni Events
<i>Systematic searching and refining of target market and competition.</i>	<i>Communication channels and meeting tools</i>	<i>Dedicated website</i>	<i>Storing and sharing of helpful resources, beneficial by region</i>	
Business Accelerator	Dissertation & Doctoral Study	Digital Platform: I3 site	SFEDI Course	1-to-1 and Group Mentoring
Enterprise Creation		Kick Start Competition	Discussion Series	

Learning	Research	Business Development & Incubation	Engagement	External Opportunities
Enterprise and Creative Media				
VLE Platforms				

4. ANALYSIS AND DISCUSSION OF RESEARCH RESULTS

Subsequently, this paper presents a novel approach to university-based start-ups through a practical and applicable entrepreneurial pedagogy within the digital education perspective, inclusive of external stakeholders as collaborative participants. Secondly, the paper addresses current narratives concerning the demand for entrepreneurialism, and new business amidst post-pandemic regeneration through the role of entrepreneurially focussed intervention and mentoring, from within the HE context by educators and networked support professionals. Figure 1 below illustrates the enterprise agenda within UWS, in action.

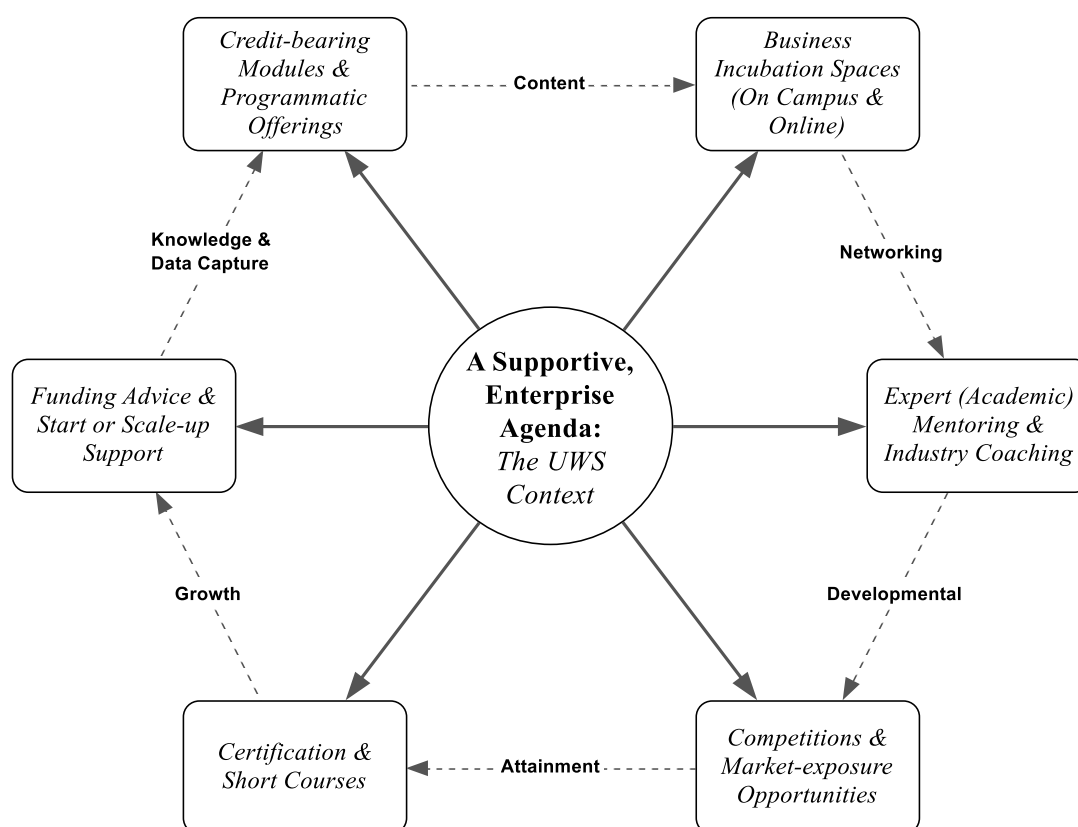


Figure 1: The UWS Enterprise Context

In practice, onboarding of student cohorts through general systems confirms the enterprise specialism per level. From there, awareness and invitation to digital communal spaces of idea generation is publicised via the online site and workshops to pool and share ideas and innovations in the marketplace. From the modules undertaken, these are primarily hosted on forums within course

sites where content and assessment information are held. Examples include Aula™, Blackboard™, Google Classroom™, and Moodle™. Alerting students to the forum spaces here not only align conversation to course content but increases confidence through the opportunity to engage and share ideas and experiences of enterprise. Digital spaces increased regular meetings and opportunities to progress ideas and projects. Also, they captured, recorded, and developed the start-up process more efficiently.

As ideas develop, the start-up process within UWS was witnessed to gather pace through business simulation tools and empirical investigation. SimVenture™, for example, was utilised within classrooms along with conducting research via sets of questions per student group to a wider population across academic schools and the public.

Context begins to be important in the start-up process, as budding entrepreneurs acknowledge the consumer and end users of potentially new products and services. Therefore, engaging with market leaders to gain further insight, digitally designing products, and utilising AI to immerse new ideas within digital landscapes and marketplace reconstructions, all promoted business ventures and gauged feedback.

This context illustration is of relevance to a wide range of stakeholders, aligned with and relevant to the various stages of the entrepreneurial, and namely the start-up, process. This includes educators and university management concerned with institutional infrastructure and resourcing of a supportive product for university-based start-ups; entrepreneurs and investors, who would be relevant towards external engagement activities encourages by university initiatives; policy makers who curate and deliver methodical and funded enterprising activity; and researchers who assess the impact and intention levels of participants of entrepreneurship programmes towards entrepreneurship.

Considering the findings of this study Figure 2 displays this paper's 'Four-stage Digital Incubation Innovation Model', which embraces the typical enterprise agenda, sought by universities. This includes a systematic process, involving information, organisation, digitisation, and incubation and acceleration stages.

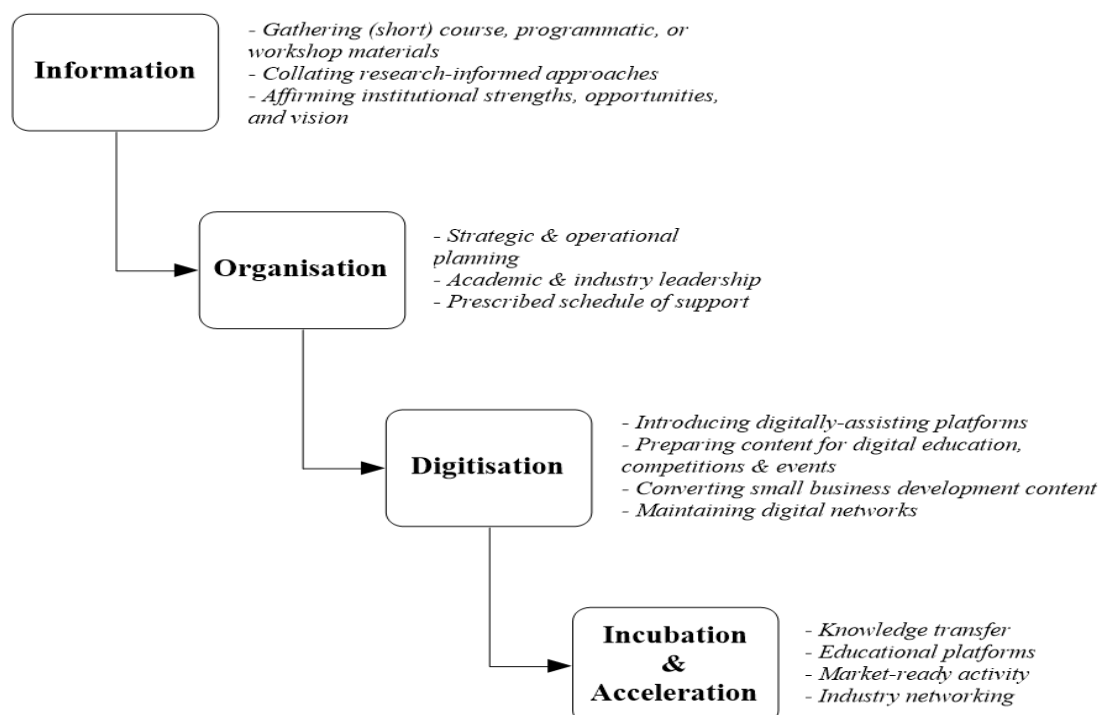


Figure 2: Four-stage Digital Incubation Innovation Model

Stage 1: Information

This first stage relates to the collating of key data and resources, which spans teaching, research, and incubator offerings. At this stage, confirmation of the university values, towards harnessing digital competences and acknowledging strengths and weaknesses within the institution is evident. Key indicators include enterprise course uptake, evidence of continued enterprise engagement by cohort(s), start-up rates, start-up and new venture investment, university rates of new business ownership or share of ownership, and rate of return.

Stage 2: Organisation

Key divisional and university leaders are notable within this second stage, as objectives and aligning these to operational duties are confirmed. The allocating of time and resources towards digital upskilling and transformation through induction and transferability exercises, concerning start-up development and activities, are underway with a schedule of task completion and ongoing implementation and testing are overseen.

Stage 3: Digitisation

The third stage reaches an output stage of digital tools, and the ongoing use of digital platforms which support start-up development as teaching and research levels. These may involve course specific platforms as mentioned, business engagement dashboards which increase visibility and opportunity for new and scalable ventures, and internal finance and resource allocation systems which monitor start-up and spin-out profitability. This includes significant 'buy in' from course and programme leaders who mentor lecturing teams and collaborate with professional support staff who use digital platforms as a medium of communication and source of start-up knowledge acquisition and business growth.

Stage 4: Incubation & Acceleration

This final stage sees the hopeful successes of incubation and/or formal acceleration activities benefitting from the use of digitised offerings. This includes the combination of personnel, spaces, infrastructure, and institutionalised digitisation of materials and support mechanisms resulting in start-ups growing, networking, marketing, and prospering.

5. CONCLUSIONS, SUGGESTIONS, LIMITATIONS OF THE STUDY

This paper has discussed many of the associated themes and topics concerning digitally-assisted start-up development and entrepreneurship education from within the university. Embracing these factors, such as the educational offering, layers of support, and opportunities for students to engage with the external environment, instigates start-ups being created and progressing.

There is an increasing appetite for enterprise across sectors, continued through the transferring of ideas and proposed solutions which respond to societal problems. Within the highly competitive, and volatile HE sector, the role of the institution is that of knowledge dissemination through teaching and increasing awareness and understanding through research. Universities are front and centre of this enterprise agenda, and fuel the next wave of start-ups and sector leaders.

Of course, issues of institutional cost, cross-programme and geographic accessibility, poor resource management, and weak external networks are some examples of the grave challenges which can hinder significant and impactful progress in terms of start-up development

At the beginning of this paper, two incentives were noted as motivation for an institutional offering of this type. Firstly, the enhancing of supportive structures for start-ups through virtual spaces. Secondly, realising the championing of enterprise, idea generation, inclusivity and accessibility through the introduction of maintenance of such spaces.

With this in mind, an evaluation of a number of enterprising programmes and activities within a Scottish business school highlighted the distinct benefits of digital platforms and the subsequent upskilling amongst start-ups. These are with a view to assisting students and new

business ideas towards reaching start-up status through supporting information, generation, organisation, incubation, and acceleration phases.

A university's enterprise agenda must be inclusive and inspiring – but now also be digitised in form. It must encourage many individuals and groups, across teaching, research, consultancy and public domains. As stressed within this paper, the UWS context highlights the crossover between these domains: content, networking, developmental, attainment, growth, knowledge and data capture. In doing so, it truly reflects the many perspectives towards being enterprising, and to support entrepreneurialism and new venture creation. Credit-bearing modules and programmatic offerings provide timely and logical content to be used more pragmatically within incubation spaces with the university environment. This leads to a blend of teaching and support staff-related skill sets operating in collaboration. However, from this space, valuable networking which is developmental by nature leads to current opportunities being taken by start-ups, whether it be grant awards or seeking capital funding. Aligning with the typical activities and responsibilities with the start-up process, universities reward successful completion of relevant enterprise courses. These vary in length but can be in the form of CPD courses or accelerator-specific programmes. From this, knowledge and data are acquired as the start-up grows in resource, capability, and mobility within the marketplace. From the specific case of this paper, it can be witnessed that there is a supportive structure which embraces many corners of the institution: academic staff, offered courses, research activity, a notable presence on campus, and significantly an online platform which supports start-ups through resources and information.

Inspired by this investigated context, the 'Four-stage Digital Incubation Innovation Model' provides a unique, process-oriented approach to the integration of digital tools and methods which organises and operationalises university resources towards start-up development. The model signposts (1) information, (2) organisation, (3) digitisation, (4) incubation and acceleration as phases upon which the university as an agile and enterprising institution can position itself as responsive to the needs to start-ups and encourage their development through both on campus and online mediums.

Findings from the paper indicate that the organisational operation and resultant culture, like all universities at the time, dramatically shifted to digital forms of delivery and communication during the pandemic out of necessity. Confronted during this time were the aspects of maintaining student engagement, the need for practical individual and academic team experience, and an institutional desire and drive to encourage enterprise.

Adoption of this mechanised approach within universities centralises common, entrepreneurial notions of process, leadership, and context. In addition, the model also emphasises the need to maximise existing resources and intellectual capital within the institution.

Students were satisfied with the level of support, and more specifically the variety of enterprising opportunities which still existed during this time. Along with the mandatory modules within enrolled programmes, there was scheduled and periodic exposure to enterprise via weekly online support for new or potential businesses, regular discussion groups and society-related activities, and the annual enterprise competition which sharply brought into focus the progress of students. These examples of communication all promoted enterprise within the institution and led to multidisciplinary start-up ideas and increased uptake of event attendance and accelerator programme participation.

5.1 IMPLICATIONS FOR EDUCATORS

The role of educators should remain central within this practical process of start-up development as conceptualisations and programmatic approaches to enterprise strengthen and validate start-up development from within universities.

The findings, and subsequent model, of this paper should motivate educators to continue the well-known embedding of enterprise across the university offering. Both undergraduate and postgraduate levels alike are now habitually integrating notions of

creativity, innovative theory and practice, and allude to the entrepreneurial process. However, the question for educators to consider is where can this be amplified through digital forms of education and digitally assisted start-up development?

Alignment of enterprise, with expected work-ready attributes including digital competency and professional skill sets, are heavily advantageous within the market and for start-ups increases their likelihood of success through exposure and customer reach, brand development, and ability to diversify.

Module and programme leaders must consider the combination of these entrepreneurial and digital attributes, and in preparing valuable and modern education reflect the expectations of the marketplace and entrepreneurs themselves.

5.2 IMPLICATIONS FOR UNIVERSITIES

It is necessary for universities to ride this 'sea change' of digitisation within education, as new waves of platform development, adoption, and re-development are apparent.

The reliance on virtual learning environments and online tools for online learning, has been consistent since the millennium. More notably, the increasing introduction of AI, and the cross-over of physical spaces and the digital world have accelerated the desire and applicability of digitisation with contemporary education and enterprising learning.

Universities are a focal point within communities and regions, culturally and economically. Therefore, they hold great importance and power. The resources and personnel available to universities, allow for the testing and implementation of desired frameworks which encourage business start-up and growth.

The steps outlined within this paper's model illustrate the many considerations which contribute to the development of start-ups, originally established within university courses or activities. Moving forward, it is key that universities are aware of their place within the HE sector and apply necessary methods which meet their institutional needs and objectives.

5.3 IMPLICATIONS FOR BUSINESS LEADERS

As stated within this paper, there are several issues and barriers which have impacted start-ups during the pandemic. Unfortunately, these remain as the costs of living, resources, and business operations are high.

With universities consistently enduring socio-economic, technological and cultural challenges, regionally and nationally, nascent entrepreneurs and their start-ups are encouraged to engage with the HE sectors. As endorsed by national organisations, and governments, a few recovery programmes for small or new businesses are emerging post-pandemic.

Therefore, approaches across the triple helix comprising of enterprising academics, entrepreneurs, and creatively minded government representatives would be timely at this present moment.

5.4 RECOMMENDATIONS

It is recommended that the resultant four-stage model from this paper is utilised in practice, to better understand current institutional initiatives and interventions concerning the digitisation of start-up development support within universities. Further investigation is required to measure, and ascertain, the impact of digitisation on start-up development. This is especially important within the current socio-economic and technological climates, where

issues surrounding survival and sustainability are ongoing concerns for business, universities, and communities alike.

There is great value in investigating the many good practices across the HE sector concerning digital entrepreneurship and the support for new ventures, utilising a number of data collection methods.

Exploratory studies, whether conducted by case study method, interview protocol, or focus group participation, may gauge the many perspectives of those delivering the many enterprising offerings and those who are in receipt of it. Organisational cultures, and the entrepreneurial context, can be more greatly understood.

Alternatively, continued cross-sector analysis of start-up rates, as well as other numerical and statistical metrics from within entrepreneurial universities would allow for regional and national comparisons to be drawn. This would inform university management, with regards to regulatory or budgetary changes to be confirmed, on the basis of uptake, or not, of enterprising projects and activities which may require updating through forms of digital transformation.

6. NOTES: KEY TERMS AND DEFINITIONS

- **Business Acceleration:** *a process or institutional mechanism whereby resources and expertise assist a growing business through several developmental, or 'scaling up, stages.*
- **Business Incubation:** *an organisation or service which aims to nurture enterprising ideas, which may be feasible and/or commercially viable, in response to a sector gap, market challenge, or societal problem. This may also include the offering of on-site facilities and workspaces.*
- **Business Start-up:** *a new venture or early-stage company, producing and marketing a product or service, in response to consumer need(s) or market gap.*
- **Digital Entrepreneurship:** *the practice of entrepreneurship in digital space, including product or service creation through new ideas or running a business, via digital technologies, online platforms, and applications.*
- **Digitisation:** *the introducing, preparing, converting, and maintaining of information within computing and digital platforms.*
- **Enterprise:** *involves a (new) business or venture, or the development of ideas or objectives towards creating economic and/or societal value.*
- **Enterprise Ecosystem:** *consists of several businesses and specialisms within industry, government, and education, creating a purposive network that contributes towards creative and innovative activity.*
- **Entrepreneurial University:** *a higher education institution embracing an enterprise agenda, including the teaching of entrepreneurship, researching of entrepreneurial activity, and supporting of new and growing businesses.*
- **Entrepreneurship:** *the activities and systematic processes upon which a new business is created, consisting of market research, idea generation, operational planning, financial forecasting, strategizing, market entry, and ongoing product or service development.*
- **Idea Generation:** *the holistic development of business ideas, including stages of reflection, critical thinking, testing, and execution for the benefit of the business, markets, and society.*

7. REFERENCES

- Ali, A., Irfan, S., & Salman, Y. (2022). A Scientometric Analysis of University Business Incubators and Accelerators Based on 20 Year of Research. *Journal of Management and Research*, 9(1). <https://doi.org/10.29145/jmr/91/03>

- Alkhalaileh, M. Y. (2021). The Role of Universities In Promoting Digital Entrepreneurial Intention Among University Students In Jordan. *Network Intelligence Studies*, 9(18), 107-115.
- Bist, A. S. (2023). The Importance of Building a Digital Business Startup in College. *Startuppreneur Bisnis Digital (SABDA Journal)*, 2(1), 31-42.
- Cerqueira, C., Lamas, M., & Baranovskiy, S. (2021). Interculturality Role in Startups Internationalization: Eligent Club's Virtual Accelerator Program case. *E-Revista De Estudos Interculturais Do CEI-ISCAP*, 3(9), 1-22.
- Crammond, R. J. (2020). *Advancing Entrepreneurship Education in Universities: Concepts and Practices for Teaching and Support*. Springer Nature. <https://doi.org/10.1007/978-3-030-35191-5>
- Crammond, R. J. (2023). *Entrepreneurship and Universities: Pedagogical Perspectives and Philosophies*. Springer Nature. <https://doi.org/10.1007/978-3-031-18243-3>
- Crammond, R. J. (2024). Evaluating intellectual capital within developmental entrepreneurial environments: conceptualising the sequential role of education and ecosystems. *Journal of Intellectual Capital*, 25(5/6), 914-941. <https://doi.org/10.1108/JIC-05-2024-0148>
- Crammond, R. J. (2025). Entrepreneurship Education and the Strategic Perspective. Zenodo. <https://doi.org/10.5281/zenodo.15276874>
- Crammond, R., Omeihe, I., & Murray, A. (2023). Re-evaluating entrepreneurship education through a team-based approach: activities and archetypes within a Scottish university. In J. H. Block, J. Halberstadt, N. Högsdal, A. Kuckertz, & H. Neergaard (Eds.), *Progress in Entrepreneurship Education and Training: New Methods, Tools, and Lessons Learned from Practice* (FGF Studies in Small Business and Entrepreneurship). Springer Cham. <https://link.springer.com/book/9783031285585>
- Crammond, R., Omeihe, K.O., Murray, A. and Ledger, K. (2018), "Managing knowledge through social media: Modelling an entrepreneurial approach for Scottish SMEs and beyond", *Baltic Journal of Management*, 13(3), pp. 303-328. <https://doi.org/10.1108/BJM-05-2017-0133>
- Crammond, R.J., Scuotto, V., Omeihe, K.O., Murray, A. (2022). Reframing University-Level Entrepreneurship Education Through Digitisation and Transformational Technologies: An Institutional Case Study. In: Hyams-Ssekasi, D., Agboma, F. (eds) *Entrepreneurship and Change*. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-031-07139-3_5
- Crammond, R. J. & Hyams-Ssekasi, D. (eds) (2024). *Entrepreneurship Education and Internationalisation: Cases, Collaborations and Contexts*. Routledge. <https://doi.org/10.4324/9781003378570>
- Heblich, S., & Slavtchev, V. (2014). Parent universities and the location of academic startups. *Small Business Economics*, 42, 1-15.
- Khan, M. A. (2022). Universities' Involvement in Promoting Digital Entrepreneurship and Future Digital Entrepreneurship Opportunities through Digital Technologies in Indonesia. *Journal of Intercultural Management*, 14(4), 39-59.
- Knickrehm, M., Berthon, B., & Daugherty, P. (2016). Digital disruption: The growth multiplier. *Accenture Strategy*, 2016(1), 1-11.
- Lamas, L. B., & Lamas, M. (2022) 'New insight into Business Innovation and Sustainable Development: The role of Education', in *Concepts and Dialogues across Shifting Spaces in Intercultural Business*, pp. 15-31.
- Lamas, M., & do Amaral Pereira, A. (2022). Digital Transformation and Business Models: Consumers Trust Case. In *Implementing Automation Initiatives in Companies to Create Better-Connected Experiences* (pp. 14-38). IGI Global.
- Lamas, M., Marques, C., Rodrigues, A., Fernández, L., & Remondes, J. (2020). Marketing, Entrepreneurship and Innovation in the Digital Era. *International Journal of Marketing, Communication and New Media*, (6).
- Mankevich, V., & Holmström, J. (2016). Gateways to Digital Entrepreneurship: Investigating the Organizing Logics for Digital Startups. In *Academy of Management Proceedings*, 2016(1), p. 13995. Briarcliff Manor, NY 10510: Academy of Management.

- Maritz, A., Nguyen, Q.A., Shrivastava, A. and Ivanov, S. (2022), "University accelerators and entrepreneurship education in Australia: substantive and symbolic motives", *Education + Training*, 65(4). <https://doi.org/10.1108/ET-08-2021-0325>
- McAdam, M., Miller, K., & McAdam, R. (2016). Situated regional university incubation: A multi-level stakeholder perspective. *Technovation*, 50, 69-78.
- Mörke, O., & Swensson, K. P. M. (2020). Exploration of virtual incubators and development of incubator services for digital entrepreneurship: Receiving Entrepreneurial support from anywhere in the world?
- Murray, A. and Crammond, R.J. (2020), "Witnessing entrepreneurial perceptions and proclivity in university students: Developing a process model", *Education + Training*, 62(4), pp. 459-481. <https://doi.org/10.1108/ET-03-2019-0052>
- Murray, A., Crammond, R., Omeihe, K.O. and Scuotto, V. (2018) 'Establishing successful methods of entrepreneurship education in nurturing new entrepreneurs'. *Journal of Higher Education Service Science and Management (JoHESSM)*, 1(1), pp. 1 – 11, <https://joherd.com/journals/index.php/JoHESSM/article/view/5/2>
- Nassar, H., & Malik, F. (2022). Role of Digital Platforms in Entrepreneurial Processes: The Resource Enabling Perspective of Startups in Pakistan. In *Innovation Practices for Digital Transformation in the Global South: IFIP WG 13.8, 9.4, Invited Selection* (pp. 130-148). Cham: Springer International Publishing.
- OECD, European Commission (2019) Policy brief on incubators and accelerators that support inclusive entrepreneurship.
- Pauwels, C., Clarysse, B., Wright, M., & Van Hove, J. (2016). Understanding a new generation incubation model: The accelerator. *Technovation*, 50, 13-24.
- Rippa, P., & Secundo, G. (2019). Digital academic entrepreneurship: The potential of digital technologies on academic entrepreneurship. *Technological Forecasting and Social Change*, 146, 900-911.
- Saavedra, A., Kotey, B., & Sandhu, K. (2020). The Digital Value Propositions for Virtual Business Incubators. In *Digital Innovations for Customer Engagement, Management, and Organizational Improvement* (pp. 1-19). IGI Global.
- Sansone, G., Battaglia, D., Landoni, P., & Paolucci, E. (2021). Academic spinoffs: the role of entrepreneurship education. *International Entrepreneurship and Management Journal*, 17(1), 369-399.
- Shah, S. K., & Pahnke, E. C. (2014). Parting the ivory curtain: Understanding how universities support a diverse set of startups. *The Journal of Technology Transfer*, 39, 780-792.
- Soetanto, D., & van Geenhuizen, M. (2019). Life after incubation: The impact of entrepreneurial universities on the long-term performance of their spin-offs. *Technological Forecasting and Social Change*, 141, 263-276.
- Stagars, M., & Stagars, M. (2015). How Universities Can Support Their Startups Today. *University Startups and Spin-Offs: Guide for Entrepreneurs in Academia*, 165-170.
- Stagars, M., & Stagars, M. (2015). The Status Quo: How Do Startups Fit into Universities?. *University Startups and Spin-Offs: Guide for Entrepreneurs in Academia*, 5-14.
- Valavanidis, A. (2020). Universities as Innovation Drivers for Major Disruptive Technological Transformations and Economic Development. *Scientific Reviews*, 2.