Leveraging AI to embed the three Es in an online PGCert Enterprise programme underpinned by EntreComp

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Stage one: background

UWTSD: its roots for the 3Es

University of Wales Trinity Saint David (UWTSD) is a Royal Chartered Body established in 1822 with its roots in vocational education. It is dual sector, with Coleg Ceredigion and Coleg Sir Gâr in its group structure. In 2014, the University celebrated its reputation for international contributions to entrepreneurial education by launching its International Institute for Creative Entrepreneurial Development (IICED). The inclusion of the word creative makes explicit our aim to design curricula and extra curricula activities to enhance innovative capacity. The first director of the IICED chaired the team responsible for producing the Quality Assurance Agency guidance on Enterprise and Entrepreneurship Education in 2012, and its subsequent review in 2018 (QAA, 2018). Mindful that the words 'enterprise', 'entrepreneurship' and 'employability' are convoluted and often used interchangeably, in our context we use the definitions from QAA's guidance and are further informed by Advance HE's Frameworks (Advance HE, 2020). As is common in our international work, we use the term 'entrepreneurial education' as a catch-all descriptor, and apt for the aims of this case study.

To further contextualise, UWTSD IICED has contributed to research into practices that inform policy, and helped to develop policy that informs practice across the globe, which in turn has provided us with comprehensive understandings to design our interventions, both within the curricula and extra curricula activities. For example, we helped to write the European Entrepreneurship Competence Framework, EntreComp, a tool designed to "improve the entrepreneurial capacity of European citizens and organisations" (Bacigalupo et al, 2016, 2), which is the underpinning framework for the qualification explored in this case.

The significant role of IICED in our employability provision is highlighted on UWTSD's employability page (www.uwtsd.ac.uk/employability) and our embedding of Entrecomp is made explicit on page 19 of our employability strategy 2022-202. In 2022-23, led by IICED, UWTSD was awarded the Triple E European Entrepreneurial University of the Year.

Enriching the soil: theoretical underpinning

Literature emanating from US business schools has dominated the entrepreneurship education research agenda. However, they are not training their instructors in the scholarship of learning, teaching and assessment (Neck and Corbett, 2018) hence a clear gap becomes evident. In contrast, there has been recent interest in the alternative 'oggies' of pedagogy, andragogy and heutagogy,

which move the learner from dependency on the educator to self-directed and lifelong learning (Jones et al, 2019). In the context of international research from the World Economic Forum (Bieser, 2023; Masterson, 2023), future work will rely heavily on the ability to be creative and analytical thinkers who can use and understand big data and AI opportunities, thus becoming entrepreneurial contributors in the workplace.

In response to these insights, at UWTSD we advocate that an entrepreneurial learning approach which encourages creativity and imagination is crucial as, without it, innovation and future oriented thinking will be scarce (Penaluna, 2023). Informed by the way that designers are taught through 'designerly' thinking (Cross, 1982, 2023), as opposed to the more recent and relatively simplistic design thinking models, we have a focus on value creation through creative endeavour.

Drivers for a PG Cert Enterprise Skills

The Covid-19 pandemic has had a profound impact on the job market, leaving graduates with limited employment opportunities. Reports from the Resolution Foundation (2020) warned of a significant increase in youth unemployment if immediate action was not taken to address this issue.
The uncertain economic conditions have created a pressing need for innovative solutions to mitigate the impact on young individuals facing limited job prospects. Recent policy reports indicate a growing interest in entrepreneurship as a viable alternative to traditional employment (Hall, 2022), and in turn the importance of developing the necessary skills to start their own businesses. Within a Welsh context, in 2019 the Welsh Government observed that "promoting entrepreneurship was vital to Welsh economy success" and, moreover, that 57% of people under 25 aspired to work for themselves (Welsh Government, 2019).

In addition to the challenges faced by graduates, employers themselves are reporting a lack of essential skills and attributes in recent graduates, emphasising the increasing demand for creative and critical skills in the digital era and the urgent need for upskilling and reskilling the workforce (CMI, 2021; Confederation of British Industry, 2020; Dahunsi, 2020; Bieser, 2023; Masterson, 2023).

To address these challenges for today's dynamic landscape, in 2021 the Higher Education Funding Council for Wales (HEFCW), through its Investment and Recovery Fund, funded interventions in Wales, including UWTSD's development of an online level 7 PG Certificate Enterprise Skills.

As entrepreneurial education is interdisciplinary, a multi-disciplinary academic team from IICED led the design of the programme. Their understandings of the domain were enhanced through their delivering European projects aimed at supporting educators developing entrepreneurial competencies within their learners, including the Erasmus project EntreCompEdu, (EntreCompEdu, 2020). Augmenting the team was expertise from our Institute of Management and Health (IMH), which validated the programme as part of our Carmarthen Business School (CBS) portfolio.

Initial planning began in March 2021 and, following advertisement, the delivery team of three fractional appointments, equivalent to 1FTE, recruited in August 2021. The diverse skills of the team, academic and digital, were enhanced by engagement with our established network of 15 Academic Champions of Enterprise, from across the disciplines. Indicative of the internal support for the

programme is that it was designed and validated in under 18 months, to be piloted February 2023.

Drivers to integrate AI and a modular model

The development team recognised the wide usage and potential opportunities offered by emerging artificial intelligence (AI) tools in education, particularly in enterprise education, especially impactful where online learners often face feelings of isolation and engage with course materials in a linear manner, which can limit flexibility, autonomy and engagement with others (Li and Wang, 2018).

Common concerns of educators include an overreliance on AI tools restricting students' opportunities for independent thinking, exploration of diverse perspectives and the development of creative problem-solving skills (Seo et al, 2021) and the increasing detection of ChatGPT in student assignments (Perkins et al, 2023). However, integration of the increasingly sophisticated AI in education is observed to have the potential to revolutionise the learning experience (Hodges, 2020; Holmes et al, 2020; Koedinger et al, 2018), as AI-powered systems provide students with the chance to interact with intelligent machines offering round-the-clock automated support, advanced translation capabilities and personalised learning experiences.

Consequently, having been supported by HEFCW to develop the PG Cert, UWTSD/IICED responded to another call for projects from HEFCW's Strategic Investment Fund. Successfully securing funding to integrate AI, with the integration of a ChatBot into its delivery, and validate a micro-credential (modular/stackable) iteration for September 2023, provided learners with an opportunity to take just one or two of the three modules, if they don't wish to pursue the full PG Cert.

Thus, in January 2023, just before the first cohort of the PG Cert, we were provided with the opportunity to maximise the effectiveness of the programme and align with its objectives by adopting an intelligent digital teaching assistant powered by AI.

Stage two: approach

PG Cert: growing the flower: Entrecomp for knowledge acquisition and competency development.

Building on understandings gained from prior interventions, EntreComp was selected as an underpinning framework. With 15 topics it was readily translated into 15 units, with five in each of 3 x 20 credit modules, as depicted in the EntreComp flower design below. Each unit is designed to provide theoretical understandings (knowledge acquisition), with approaches to teaching, learning and assessment, which in turn enhance respective competency development. The first of the modules is Ideas and Opportunities, the second, Resources and the final, Into Action.

Figure 1. EntreComp (Bacigalupo et al, 2016)
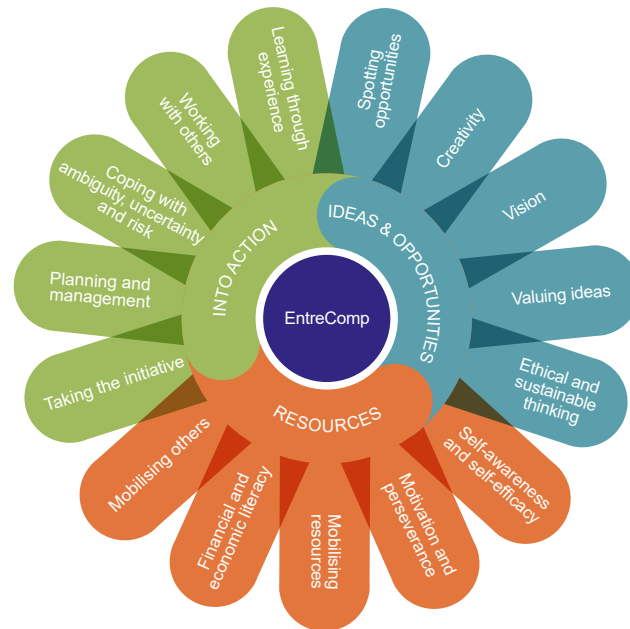
However, it should be noted that while this is a convenient model, the topics are interdependent. By way of example, creativity underpins each competency and valuing ideas is integral to protecting that creativity, with an understanding of intellectual property rights, an aspect that is often overlooked (Penaluna and Penaluna, 2023).

Stage 2: integrating AI: approach

Using the messaging app 'Quick Chat' to curate a reliable internal database and implement filters to prevent inappropriate content, learners train a chatbot by developing questions and answers aligned with their studies, generating a corpus/database of information co-created with the programme team. Ongoing interaction allows students to personalise and tailor the chatbot's answers according to their individual needs and understanding.

The programme's approach aimed to fulfil several key objectives:

+ to foster the development of an entrepreneurial mindset by encouraging students to identify opportunities and think creatively, supplemented with real-world experiences embedded in the curriculum

+ to adopt authentic assessment methods that require students to generate tangible documentation necessary for setting up, financing and operating projects or enterprises. This approach enables students to demonstrate their understanding and application of entrepreneurial concepts and skills in a practical and meaningful manner

+ to emphasise the enhancement of employability through the cultivation of transferable skills highly sought after by employers across diverse industries as well as the support to launch their own successful ventures

+ to provide AI-supported tools and resources, such as the GPT-3 chatbot to act as an AI-powered teaching assistant, facilitate idea generation, encourage innovative thinking, and encourage improved risk-taking propensity (Kayan and Uysal, 2021)

+ to use AI to provide students with real-time feedback and support throughout their learning journey, augmenting students' capabilities while maintaining the importance of critical and creative thinking, ensuring the authenticity and integrity of their ideas are preserved.

Stage 2: programme delivery: the how

The programme provides asynchronous and synchronous provision, designed for full-time and part-time learners, and built with bite-sized learning sessions ranging from 5 to 60 minutes. The synchronous element provides opportunities for the tutor to gain continuous feedback and to iterate accordingly. Unlike traditional online courses that rely heavily on reading, this course employs action pedagogy, encouraging learners to 'learn by doing'. Learners engage with the latest AI-enabled technology, including chatbots trained to help deepen their understanding of course materials, 24/7. Using AI, students benefit from sophisticated language translation features and a more dynamic and interactive learning environment.

Throughout the course, learners gain an appreciation of Microsoft's advanced technologies, including Teams, Streams, Sway and Class Notes. They are immersed in the entire Microsoft Office 365 account, empowering them with the most up-to-date user experience, with tools that they will use within the workplace.

Learners build a portfolio of work that can be used to canvas and onboard potential employees, supporters and investors. Instead of essay writing, the course leverages multi-modal tools such as video, interactive experiences and social engagement. Bespoke video lectures, filmed, post-edited and curated by course staff and their team of supporters, further enhance the learning experience.

Stage three: outcomes

We are beta testing the product with a view to rolling out the AI into other programmes of study. The pilot cohort comprises seven learners, six home and one international, commencing in February 2023. The extent to which learners engage with the AI is optional and to date all students are participating. In additional to a small number of participants, outcomes are limited to learner and educator experiences of just the first module.

Key outcomes of the programme revolve around providing an online offering that enables students to gain a deeper understanding of the skills required to develop and manage successful businesses and other value-creating ventures. Students are observed to be cultivating an entrepreneurial mindset, enhancing their ability to identify opportunities, think creatively, and make informed decisions. Moreover, the programme is seen to nurture transferable skills such as communication, teamwork and problem-solving, ultimately improving students' employability across various industries.

Key findings

1   Funding implications of the PG Cert route

The small enrolment doesn't reflect graduate demand for the product, but that funding options for PG Certs are limited, not least that postgraduate loans backed by the government are not available.

2   Synchronous v asynchronous

The programme design affords its delivery in an asynchronous mode. However, to obtain feedback on content and build a corpus of knowledge for the chatbot, there has been synchronous delivery. The learners confirmed the desirability of the asynchronous provision, in their being able to access materials and work through them at their own pace, at times convenient to them. However, all were in accord that the synchronous elements, engaging with peers and the one to ones with the tutor (s) not only enhanced their understandings of the topics but increased their motivation and confidence to take forward their ideas and pivot accordingly.

3   Balancing academia with fostering an entrepreneurial mindset

The approach integrates theoretical underpinning, within an entrepreneurial framework, enabling students to develop their creativity, identify opportunities and embrace risk-taking in a way that caters to their specific needs and contexts.

4   Leveraging AI technology and innovative teaching practices

+   This iterative process has enabled the chatbot to provide more accurate and tailored responses to students' enquiries.

+   The educational AI system has proven to be a valuable support tool for individuals who have faced disruptions in their learning due to the impact of the pandemic. Designed to reach learners who may otherwise face barriers in accessing education or balancing work commitments, the programme's learning activities facilitate peer-to-peer engagement and collaborative tasks, creating an environment conducive to effective engagement with enterprise and entrepreneurship concepts.

+   The programme uses feedback from both staff and students to develop an AI system that delivers a customised learning experience. By combining human-guided navigation with AI-supported technology, the programme enhances the online learning experience for distance learners, providing them with a guided classroom experience. This cost-effective AI system, co-produced by staff and students, becomes a valuable resource that continuously evolves based on accumulated FAQs from students and staff, benefiting future cohorts of enterprise learners and supporting students from diverse backgrounds in both full-time and part-time provision. Noting that, with a digital expert in the team, there is not an additional resource requirement for the provision and suggestions quickly adopted.

Both staff and students involved in training the AI system and assessing its impact gain practical experience with AI, which adds value to their respective courses. The project also highlights the potential of AI in fostering inclusive learning. Recognising the need to support educators in effectively integrating chatbots into entrepreneurship education programmes, the project underscores the importance of training and technical support to maximise the benefits and navigate potential challenges (Jazdi and Verner, 2020).

5   Ecosystem of support.

The programme was seen as a highly desirable pathway, one that supports UWTSD's reputation as the leading university for graduate businesses that have thrived for three or more years (HESA, 2022).

The 800+ entrepreneurial alumni running these businesses inform our provision and are integral to our inclusive eco-system of support (Kruegar, 2021), who engage with our wider University team to provide startup mentoring, further empowering the learners to transform their ideas into successful ventures.

Next steps

One of the part-time cohorts is a programme director within UWTSD, whose motivation for undertaking the programme was for ideas to develop their programmes to be more innovative and entrepreneurial. Their observation that the studies to date are responding to that need has reinforced the delivery teams observations that the programme could be readily pivoted to educate educators who are charged with development of the 3 Es.

Continuing research activities include a series of hackathons that enable educators from the Business School and Education to explore potential ways in which the PG Cert and its integration of AI could inform their own programmes of study. Educators and learners have reflected that using AI as a tool to collate information has its limitations, hence the small initial pilot programme is enabling 'AI proofing' before fuller integration. Requests for training are being received from all disciplines as awareness of the intervention increases, indicative that the model being beta tested will positively impact on UWTSD's offer. Moreover, it can inform developments in other universities.

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