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Innovations in Education and Teaching International

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/riie20

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To cite this article: Matteo Borghi (21 Jul 2024): Embedding entrepreneurship and technology literacy in the student curriculum: A case study of a module for real estate students, Innovations in Education and Teaching International, DOI: 10.1080/14703297.2024.2382413

To link to this article: https://doi.org/10.1080/14703297.2024.2382413

Published online: 21 Jul 2024.

INNOVATIONS IN EDUCATION AND TEACHING INTERNATIONAL
https://doi.org/10.1080/14703297.2024.2382413

Routledge
Taylor & Francis Group

Embedding entrepreneurship and technology literacy in the student curriculum: A case study of a module for real estate students

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ABSTRACT

Ensuring a pedagogical emphasis on practical entrepreneurial experiences and technology literacy is essential across all educational stages. This paper presents a pioneering case study of curriculum innovation in higher education, specifically within real estate and planning programmes. The 'Managing Change in the Real Estate Sector' module is examined as a transformative initiative that integrates entrepreneurship and technology literacy in a subject-specific curriculum. Leveraging experiential learning principles, the module design addresses industry demands and aligns with contemporary educational paradigms. The systemic impact of the module is explored at the student, curriculum, and wider university levels. The study reveals positive outcomes, marked by enhanced student satisfaction, skills development, and industry engagement. The impact extends beyond the classroom, influencing curriculum design and receiving commendation at both internal and external levels. The paper concludes by discussing the broader implications for higher education, emphasising adaptability and innovation.

KEYWORDS

Entrepreneurship; technology literacy; experiential learning; curriculum design; student-centred learning; real estate education

Introduction

In the contemporary landscape of higher education, universities face an increasingly intricate challenge – preparing students not only with current technical knowledge but also with practical skills and competencies crucial for navigating a society where employability is a primary concern (Canboy et al., 2016). Recognising the imperative to meet these evolving demands, educational institutions are compelled to shift their teaching paradigms from traditional, curriculum-centric approaches to more student-centred methodologies (Wang & Zhang, 2019).

In alignment with the European Commission Skills Agenda for sustainable competitiveness, social fairness, and resilience, the present environment in higher education underscores the criticality of transversal and entrepreneurial skills, and skills to accompany the digital transition (European Commission, 2020). As recommended by the

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European Commission (2018), an emphasis on practical entrepreneurial experiences and technology competencies are essential at every stage of education. This necessity gains particular relevance in sectors experiencing rapid technological evolution which is reshaping the future workforce requirements, such as real estate (Abualzolof, 2022). Yet, an observable gap persists between the competencies demanded by the industry and the conventional university curriculum (Canboy et al., 2016).

Recognising the need for a transformative approach, I delve into a focused exploration of the 'Managing Change in the Real Estate Sector' (MCRES) module, that I led since its inception. This innovative module bridges the identified gap between industry demands and university curricula. Rooted in experiential learning theory (Kolb, 1984), it addresses the evolving needs of the real estate sector offering students a significant learning journey beyond traditional classroom boundaries. Central to this approach is the incorporation of student-centred activities, collaboration with entrepreneurial actors, and the integration of authentic assessments, all aimed at improving student engagement and ensuring the development of practical skills. By critically evaluating the efficacy of this initiative, I aim to contribute insights into systematically incorporating entrepreneurship and technology literacy into higher education.

Teaching entrepreneurship

Entrepreneurship, a multifaceted subject extending beyond mere business creation, demands a unique approach in higher education. As Schumpeter (1934) asserted, it involves seizing opportunities in times of change, embracing risks, and transforming innovative ideas into reality. The symbiotic relationship between entrepreneurship and innovation, where innovation serves as the means to exploit change-driven opportunities (Drucker, 2014), underscores the intricate nature of this field. Essential to success in entrepreneurship is the cultivation of a distinct thinking logic – effectual thinking, different from managerial causal reasoning (Read et al., 2016).

Extant research advocates for a method-oriented strategy in teaching entrepreneurship (Neck et al., 2014). This emphasises shaping student thinking through immersive experiences and practical applications, aligning with the view that entrepreneurship is a socially constructed phenomenon (Seikkula-Leino et al., 2010). Learning by doing (Kolb, 1984) becomes pivotal, requiring a pedagogical approach informed by a social constructivist view of learning. To facilitate knowledge creation and self-regulated learning, adopting a dialogic approach is crucial. This involves stimulating two-way discussions with students and incorporating peer assessment (Nicol & Macfarlane-Dick, 2006). The entrepreneurship educator assumes the role of a facilitator, guiding students in acquiring knowledge and developing an entrepreneurial mindset (Neck et al., 2014).

Technological disruption in real estate: Unveiling the future landscape

In recent years, the processes governing real estate transactions and property development have undergone a profound transformation, challenging traditional perceptions (Baum et al., 2020). Technological innovation has emerged as a key disruptor in the real estate sector, reshaping the industry's fundamental dynamics and practices (Abualzolof,

2022). Scholars and practitioners have recently coined the term 'PropTech' (short for Property Technologies) to refer to the digital transformation in real estate, defined as:

> 'one small part of the wider digital transformation of the property industry. It describes a movement driving a mentality change within the real estate industry and its consumers regarding technology-driven innovation in data assembly, transactions, and the design of buildings and cities'. (Baum et al., 2020, p. 5)

PropTech encapsulates a mindset shift so that real estate firms in the property industry can more confidently embrace technology-driven innovation to create value in the sector. The third wave of PropTech, known as PropTech 3.0, is on the horizon heralding the deployment of fourth Industrial Revolution technologies such as the Internet of Things, simulation, robotics, virtual reality, big data, and analytics (Baum et al., 2020). Despite the transformative potential of these technologies, a significant portion of real estate firms hesitates to fully embrace digital transformation, citing barriers such as unclear returns on investment and a shortage of appropriate talent at property companies (KPMG, 2019). As the industry navigates the uncharted territory of PropTech 3.0, it becomes crucial for future leaders to grasp these advancements and champion a mindset shift within the industry. Through entrepreneurial skills and an innovative mindset, the next generation can play a pivotal role in unlocking the full potential of technology, creating value, and shaping the future of the real estate sector.

Background

In response to the evolving landscape of real estate and the dynamic expectations of the job market, my institution introduced a strategic modification in the full-time undergraduate programme for real estate and planning students. This transformation included the integration of an innovative module titled 'Managing Change in the Real Estate Sector'. The latter is designed with a specific aim – to equip students with indispensable skills in entrepreneurship and technology literacy. The focal point is an interdisciplinary team project, where students engage in delivering beneficial change within the real estate sector. The impetus for restructuring the curriculum stemmed from the imperative to enhance students' readiness for the anticipated demands of prospective employers.

The guiding philosophy involves a transition towards a student-centred methodology, placing a significant emphasis on cultivating skills and competencies. Before the restructuring, the module was focused on managerial causal reasoning rather than effectual thinking and development of practical skills. The integration of academic content with the practical demands of the professional realm became a cornerstone of this initiative. The decision to incorporate entrepreneurship and technology as key pillars in the students' curriculum was substantiated through rigorous focus groups with real estate industry experts. These revealed that graduates lacked creative problem-solving skills and needed better preparation regarding digital transformation and the impact of new digital technologies.

Managing change in the real estate sector

MCRES is a compulsory module for part 2 Real Estate and Planning Students. Distributed over seven months, for each lecture, I introduced a practical seminar session, to reinforce students' learning as a result of practically conducting specific activities in a small group setting. To help students acquire technology literacy skills, alongside the main lectures, a series of guest technology lectures were introduced. These included 1) the Internet of Things, 2) Augmented and Virtual Reality, 3) the Metaverse, 4) Robotics and Automation, and 5) Big Data and Machine Learning. Each technology lecture provided students with a basic understanding of the technology, a range of examples of its applications in the real estate sector and critically discussed some of the challenges and barriers related to its adoption.

During the planning and design stages of the module, I ensured that the overall aims and objectives were delivered through a series of coherent learning activities, which was also reflected in the assessment structure. Accordingly, my practices follow a constructive alignment approach by which the learning outcomes are defined before the learning activities take place (Biggs, 1996). The main assessment of the module is a team project whereby the objective is to create a unique selling proposition that could solve a real-world problem in the real estate sector and utilise new digital technologies to revolutionise existing practices in the sector. In this manner, I ensured that the project combines the two main elements of the module, namely entrepreneurship and technology literacy, with a focus on the real estate sector. The team project undergoes evaluation through two components: a comprehensive written business plan and an oral presentation conducted within a competitive environment. The seminar activities were structured to facilitate the gradual development of the teams' business concepts by providing guided opportunities to apply theoretical frameworks directly to their projects. To ensure alignment with the intended learning outcomes, meticulous marking rubrics have been developed for these tasks. Notably, a distinct criterion focusing on technology proficiency was integrated into the assessment rubric for the business plan. This criterion was designed to assess the team's comprehensive understanding and critical analysis of the technology integrated into their proposed new ventures.

Given the inherently experiential and practical nature of the entrepreneurial module, a subject that demands hands-on engagement and application (Neck et al., 2014), I opted to integrate a student-centred global event, known as the 'Global Henley Prop Tech Forum' (GHPTF), into the module curriculum. This event revolves around the discussion of the impact of new technologies in the real estate sector with technology experts, leaders of national PropTech associations and senior venture capitalists. It provides valuable insights into the current market and competitive landscape, essential components of the teams' business proposition development process. Furthermore, the GHPTF sessions were strategically scheduled midway through the module, following six weeks of lectures and initial business idea development during the seminar sessions. While the sessions included oral presentations from speakers, they were complemented by a general Q&A and an interactive co-creation session with external guests. This format allowed individual student teams to directly interact with industry experts, refining their business ideas and aligning them more effectively with technological potentials. The aim was to increase the impact of guest speakers while enhancing students' engagement (Li &

Guo, 2015). Besides, with the conjoint support of my colleagues delivering the module in our campus in Malaysia, we connected our UK and Malaysia campuses in real-time seamlessly adding an element of cross-fertilisation to the event. The inclusion of perspectives from speakers across both campuses served to not only create new knowledge and improve self-assessment skills but also to enhance students' motivations and encourage persistence (Nicol & Macfarlane-Dick, 2006), which are central to fostering the practice of creation in entrepreneurship education (Neck et al., 2014). This global forum is a unique event, which aims to improve the link between academia and the industry environment, helping students to effectively grasp the link between entrepreneurship, technology disruptors and the real estate sector globally.

The module concludes with the students presenting their venture ideas. Yet, to comply with the University's new teaching and learning policies related to the assessments, students are assessed in a Dragons' Den (DD) style assessment. Resembling the elements of the famous British television programme, where aspiring entrepreneurs pitch their business ideas to five multimillionaire investors for funding, the students' team presents their projects to a panel of esteemed experts in real estate and entrepreneurship, known as the 'Dragons'. The competitive and authentic nature of this DD-style assessment aims to motivate students to actively participate and invest in their learning. The experience also fosters an entrepreneurial mindset by instilling traits such as resilience, risk-taking, and a proactive approach to problem-solving by providing a platform for assessing and evaluating students' soft skills, such as presentation skills, interpersonal communication, and the ability to handle pressure. Lastly, the unique and memorable format of the DD-style assessment can contribute to a positive and impactful learning experience that students are likely to remember and apply in future endeavours. In anticipation of the students' oral presentations, I incorporated two formative opportunities to present parts of their business ideas in the module seminars, complemented by a dedicated workshop focusing on refining pitching techniques. These initiatives aim to equip students with the essential skills and confidence needed for succeeding in their DD presentations.

My teaching and learning methods align closely with Challenge-Based Education's multidisciplinary approach, collaborative problem-solving ethos, and emphasis on technology utilisation for addressing real-world challenges (Leijon et al., 2022). However, my approach introduces distinct elements, including structured provisions for technology familiarisation, targeted interactions with subject matter experts, and the integration of sharing activities within an authentic assessment setting. These nuanced differences enrich the learning experience, fostering deeper engagement and skill development among students.

Research methods

Following the lead of recent studies related to new module design (e.g. Babinská & Pleschová, 2023; Canboy et al., 2016) to evaluate the effectiveness of MCRES, different types of data were collected. First, I collected student mid- and final module evaluation feedback. Mid-module evaluation feedback was generally related to areas of the module which are working well and areas that could have been improved (52 responses over 113 students enrolled in the UK). The final module evaluation feedback included a set of more structured questions regarding the learning experience, the content of the module,

assessments, received feedback and whether the module provided opportunities to apply the learning. Despite the module convenors in the UK (myself) and Malaysia actively seeking feedback on the first edition of MCRES, only the Malaysia campus was able to achieve a good response rate in the final module evaluation (50% of the 20 students enrolled). Thus, I will focus on the Malaysia campus statistics for the final module evaluation, while all other data will pertain to the UK campus. Second, I collected qualitative feedback from students, senior academics, and industry experts after the GHPTF and the DD assessment. Third, in the evaluation of the module, I will use my observations, as the module convenor in the UK campus, recorded in a reflective journal (Babinská & Pleschová, 2023). These include notes about students' contributions, with a special focus on entrepreneurship and technology literacy and whether the global forum and final presentation have enhanced the student experience. This evaluative study successfully underwent the ethical review process conducted by my institution.

Findings and discussion

Preparation of the module

In addition to the academic development of the module and ensuring sufficient training for the teaching staff involved, one of the main challenges faced was the resourcing of the module and organising key activities involving external guests. I had to expand my network to identify individuals who could contribute effectively to the module's objectives. This entailed participating in individual conversations and assessing guest speakers' suitability. However, the delivery of the module required a collaborative approach that brought together diverse expertise from within the Business School. For instance, the career team supported the selection of judges for the DD sessions (nine) and speakers for the GHPTF (six). Moreover, members of the administrative team provided logistical support and facilitated interactions with external guests. The public relations team helped raise awareness about the module, while the fundraising team assisted in securing financial support and strategic partnerships.

Despite these collaborative efforts, several challenges arose during the preparation phase. For instance, there were occasions when judges withdrew unexpectedly, necessitating prompt adjustments to ensure the seamless facilitation of DD sessions. Ensuring alignment of guest lectures with the content of the module also posed a challenge, requiring careful coordination and communication with guest speakers. Furthermore, coordination among members of the internal support teams required constant updates and clear communication channels. Overall, the successful preparation and delivery of the module were made possible through effective collaboration, proactive problem-solving, and adaptability in addressing unforeseen challenges.

The student experience

Initial response

In the initial stages of the module, a mid-module evaluation survey was administered to students after four weeks of engaging lectures, characterised by small breaks with open discussion, brainstorming sessions and problem sets. Noteworthy feedback

emerged, highlighting positive aspects of the student experience. Specifically, students expressed appreciation for the well-structured main lectures and seminar materials, the incorporation of practical teamwork activities within each seminar session, and the systematic approach guiding the development of their module projects. However, valuable insights were garnered regarding potential enhancements. Students articulated a desire for a more explicit connection between the technology-focused lectures and the overarching themes of the module. Furthermore, students emphasised the need for more individualised guidance during team projects.

Upon reflections and informal conversations in the initial weeks of the module, a discernible resistance to a shift in mindset became apparent to me. Some students articulated their challenges, noting that the module's design diverged significantly from their prior academic experiences at the university. The introduction of creative problem-solving methodologies, proactive teamwork for business proposition development, and the integration of disruptive technologies posed a departure from their accustomed comfort zones. Particularly challenging was the conceptualisation of a business idea from scratch, a process unfamiliar to many students.

In addressing initial concerns, I used open communication, emphasis on the link with the world of practice especially leveraging the GHPTF, and the long collaborative team journey. A specific announcement in writing was redacted to respond to student feedback in the mid-module evaluation. This featured the link between the provided resources and the aims of the team project and emphasised that the challenges the students were facing were intentional aspects of the module's learning objectives, aimed at pushing them beyond conventional boundaries. Acknowledging the discomfort associated with the uncharted territory of creating a business idea, it stressed the commitment to guidance and mentorship throughout the module.

Additionally, since the mid-module evaluation happened before the Global Henley PropTech Forum, the written response reminded students that the GHPTF would have significantly reinforced the understanding of technological trends discussed during the lectures. Indeed, international industry experts at the forum would have provided deeper insights into the application of new digital technologies in the sector and their associated challenges. Nonetheless, I insisted that it was significantly important for the students' teams to come to the event having finalised a draft of their initial business idea and how they would have wanted it to operate. This was strategically important since it would have helped the teams to extract the maximum amount of learning during the co-creation stages of the GHPTF, interacting with experts. Lastly, the response clarified that this was a long collaborative journey and that the seminar sessions, which were deliberately structured as developmental and mentoring sessions, would have played a key role in refining students' business ideas. These sessions in the following weeks would have facilitated personalised 1-to-1 conversations, allowing tailored guidance to be provided to each team and the establishment of customised project milestones. Furthermore, the teaching team ensured a more thorough discussion of the benefits of each seminar activity in shaping a robust venture proposition and business plan.

Alongside the written response, I spent time during the following lecture discussing all the points that arose with the students. Among them, upon further consideration, the exposure to extant trends in the PropTech community during the GHPTF

significantly helped the students to grasp the benefits of the module and its link with the world of practice. Indeed, during the upcoming seminar sessions, the teaching team noticed an improved understanding of the market and more cogent and clear value propositions. Efforts through open communication, linkages with industry practice, and proactive awareness-building were integral to ensuring a more comprehensive understanding and appreciation of the module's structure and support mechanisms. These strategies offer insights that may be beneficial for future innovators.

Main events and final evaluation

Regarding the two main events of the module, students seemed to particularly appreciate the design and format of the Global Henley PropTech Forum. When asked to comment anonymously after the session, they felt the event was professionally run and that was interesting to acquire knowledge about PropTech from a diverse array of speakers involved in the PropTech entrepreneurial ecosystem. In particular, the Q&A and co-creation sessions were seen as very useful. Interestingly, this is also reflected in the business plans submitted by the students for their new venture ideas, whereby different teams mentioned that the conversations during the global forum were particularly helpful in steering their initial business proposition in the right direction.

Contrastingly, the DD was described as a challenging event and setting that, however, pushed students to deliver the projects to the best of their abilities. For instance, a member of one of the winning teams commented by saying:

> It was a great opportunity to present our business ideas to Dragons who were able to advise us on our ideas and really see how a small idea can become a reality. I also thought that the whole process of working as a team and winning as a team is incredibly rewarding. I believe that my knowledge of the changing trends of the real estate sector has intensified and developed.

This sense of pride in what the students have developed and the real-life setting they pitched their ideas was publicly shared by other students on social media platforms (e.g. LinkedIn) where students showcase their business ideas and thank the teaching team for their efforts along the way.

The journey continued, and as the module concluded, a comprehensive final evaluation revealed a high level of satisfaction among the majority of students (4.4/5). Clear requirements for assessments (4.3/5) and positive acknowledgement of experiential learning and mentoring further underscored the MCRES's success. Notably, the positive scores (4.3/5) on questions related to applying learning, opportunities to interact with staff, and receiving useful feedback highlighted the effectiveness of the module's design. Qualitative feedback across campuses echoed the positive sentiments. Students expressed satisfaction with the entrepreneurial nature of the module, the teamwork component, and the enthusiasm and passion of the teaching team. Additionally, positive comments were provided regarding the technology lectures, with one student stating:

> I have particularly enjoyed the tech sessions and it is not something I would usually spend time on learning but it has broadened my knowledge.

This sentiment was further supported by the fact that the technology criterion in the business plan received one of the highest scores. However, perhaps most telling was the following comment:

> Although I started off not too keen on this module and the idea of the dragons den project, by the end of it, I have grown to really love it!

This comment encapsulates the transformative nature of the students' experience throughout the module – a journey that began with initial resistance and evolved into genuine appreciation and enthusiasm. It reaffirms the effectiveness of the module's intentional design, responsive adjustments based on mid-module feedback, and the unwavering commitment to guiding students through a mindset shift towards successful entrepreneurial endeavours by leveraging technology literacy skills. A notable achievement stemming from the module is the recognition of a venture created by one of its students, recently shortlisted among the top 50 semi-finalists in the prestigious European PropTech competition. Lastly, in the final evaluation, there was a call for more examples of the application of entrepreneurial management concepts in the real estate domain and more support in the validation of their venture concepts collecting primary data. Additionally, during informal conversations, students expressed a desire for peer assessment.

The curriculum design

The impact of the module and its associated activities on curriculum design has been substantial, with recognition from relevant authorities involved in the module assessment. Notably, the module has been selected as the main compulsory team project for Part 2 students in the upcoming academic year, reflecting its central role in the programme restructuring. Additionally, it has become a distinguishing feature of undergraduate real estate and planning degree courses, prominently featured in promotional materials during open days and visit events.

Central to this distinction are endorsements from internal and external speakers who participated in key activities such as the GHPTF. One contributor praised the forum's multidisciplinary approach, acknowledging students' engagement and curiosity. Another speaker, member of a PropTech professional association, highlighted its impact in broadening students' perspectives to understand global challenges in the built environment ecosystem. Consultations with experienced colleagues further underscored the forum's role in providing rare opportunities for students to learn from global experts in real-time, fostering international perspectives and enhancing their overall student experience and graduate employability.

Similarly, the DD competition received commendation from industry professionals, who praised students' entrepreneurial ideas delivered with enthusiasm. Members of the internal Centre for Entrepreneurship noted the event's success in boosting students' confidence and team building while other judges emphasised its significance in preparing students for the entrepreneurial aspects of their future careers. After a debriefing session with the Dragons, I incorporated a recommendation to add a criterion for Q&A sessions to the marking rubric, enhancing the assessment of students' presentations based on their feedback.

University level

The incorporation of the MCRES module into the university curriculum reflects a strategic alignment with the institution's core principles, notably prioritising community engagement and extending its influence beyond campus. By imbuing students with essential entrepreneurial and technology literacy skills, the curriculum readies them for successful careers and contributes to the local and global communities, fostering the development of future leaders. This strategic approach aligns seamlessly with the university's commitment to empowering students with competencies that extend beyond academic knowledge, thereby fostering positive community impact.

The initiative extends beyond campus borders through embedded activities such as the GHPTF and DD, playing a pivotal role in broadening the university's influence. These events actively connect students with industry experts, bridging academia and entrepreneurship on a global scale. This outreach enriches the educational experience for students and contributes to the broader network of entrepreneurial actors, shaping economic ecosystems at local, national, and regional levels. The resulting knowledge spillovers enhance the university's role as a hub for real-world impact, resonating far beyond its physical campuses.

Additionally, the integration of authentic assessment further underscores the university's commitment to contemporary and effective teaching methodologies. The real-world scenario of the DD presentation serves as a tangible example. By aligning assessments with real-world challenges, the university fosters an environment that nurtures resilience, risk-taking, and proactive problem-solving.

Conclusions

This evaluative study demonstrates the transformative impact of the 'Managing Change in the Real Estate Sector' module in higher education. By integrating entrepreneurship and technology literacy into the curriculum, it meets industry demands and modern educational paradigms. Despite facing a diverse array of challenges during the development and delivery, student experiences show a shift from initial resistance to enthusiastic engagement. Key initiatives like the Global Henley Prop Tech Forum and the Dragons' Den assessment contribute to enhanced skills development and an entrepreneurial mindset while extending the module's influence beyond the university. My findings suggest thorough preparation, responsive adjustments, effective collaboration, and proactive communication are crucial for addressing challenges and fostering student engagement, and I recommend these are used in similar initiatives.

Acknowledgments

I thank the Real Estate and Planning, Leadership, Organisations and Behaviour departments, the Henley Centre for Entrepreneurship, the Reading Real Estate Foundation, and the admin, career, fundraising and PR teams for supporting the initiative.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Notes on contributor

Matteo Borghi is a Lecturer in Entrepreneurship and Innovation at the Henley Business School, University of Reading. His research and teaching lie at the intersection of entrepreneurship, innovation and data science, with special reference to the impact of Industry 4.0 technologies on digital business modelling.

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