Flexible future learning opportunities for built environment professionals – A case study

Abstract

Purpose
This paper discusses the re-development of MSc Civil Engineering and Construction Management of a modern university in the Midlands of the UK in recent years, with the aim to offer flexible future learning opportunities for built environment professionals and address the sector's skill shortage concerns (Augar Review, 2019 and 2021; DfE, 2020 and 2021; Foresight Review, 2017).

Design/methodology/approach
The research method is insider action research and a case study approach. It involves interviews with external and internal stakeholders who contributed to this re-development and review of relevant documents related to the development.

Findings
The research finding showed that both the internal and external stakeholders welcome the proposed re-development of postgraduate courses in Civil Engineering and Construction Management. They found the course offers opportunities for civil engineering and construction professionals to further develop their skills and to address government initiatives on flexible and future learning. The online offer of the course is attractive to potential students. It has brought a substantial financial return to the University and created a new international presence of the course and the University.

Originality
This paper is a pilot study examining a university's response to skill shortage and government proposal on flexible learning for adults through re-development and enhancement of the offer of the existing postgraduate courses.

Research limitations/implications
It has been argued that an insider research approach may have an advantage in accessing information compared to other research methods. The case study approach may have limitations on generalizability.

Practical implications
This research can be used as an example for other universities that aim to enhance their existing offers to address government initiatives and enhance financial viability.

Keywords
Flexible learning, Future learning, Built environment professionals, Higher Technical Qualification

Paper classification
Case study

1. Introduction

The UK government has placed a strong focus on flexible learning and skills enhancement for adults in the recent years and it has reflected on the reviews and conducted in recent years (Augar Review, 2019 and 2021; DfE, 2020 and 2021; Foresight, 2017).

Skills play an important role in contributing to and sustaining a prosperous economy and an inclusive society. Skill improvement and enhancement can also directly enhance workers' productivity and increase wages, which leads to a boost in growth and consumption across the economy. Lifelong learning is one of the pathways for skills-driven economic growth, which is building on the skills that individuals have equipped when they leave the education system, enabling workers to adapt to the changing demands for skills and manage transitions in the future (Foresight, 2017).

Skills shortage is an ongoing concern in the UK economy. Employers who have responded to a survey conducted by Sentence (2015) indicated even skill-shortage vacancy of one staff felt that it had negatively affected their company in a number of ways, 42% of respondents stated that it causes loss of business to competitors and 43% stated increased operating costs. There are also wider implications of skills shortage, 84% of employers who responded thought skill-shortage vacancies increased the workload for other staff which affects their well-being and 48% stated said it caused difficulties in meeting customer services objectives (UKCES, 2015). It is understandable that the cumulative impact of skills shortages in wider economy is difficult to quantify. Nevertheless, an estimation from Sentence (2015) stated that all vacancies created between 2014 and 2015 were filled at the current average wages, UK GDP would be boosted by £10bn.

The concern is not only for the workforce who just enter to the labour market, but also for the workforce at different skill levels. The UK Employer Skills Survey 2015 found that more than 20% of the 930,000 reported vacancies were 'hard to fill because of skill shortages, which equates to 209,000 'skill shortage vacancies' experienced to some degree by six percent of all employers (Vivian *et al*., 2016). The skill-shortage trend has continued until 2020. The UK Employer Skills Survey 2020 reported that despite a fall in job vacancies between 2017 and 2019 (17% compared with 20%) more vacancies than at any point in the Employer Skills Survey series, since 2011, were proving hard to fill due to lack of qualifications, relevant skills or experience. Skill-shortage vacancies comprised nearly a quarter of all vacancies in 2019, 24% up from 22% in the 2013 to 2017 period (Foresight, 2021).

The construction sector has the second-highest skill shortage in the UK, with 34% of jobs classed as hard to fill in 2015 and 36% in 2017 and 2020 (Foresight, 2021). The proportion of hardest-to-fill occupation categories are in skilled trades (43%), machine operators (33%), and professional occupations (32%) (Vivian et al., 2016). Specific skilled occupations are also in shortage, more than half of the Home Office Migration Advisory Committee's indicators for the existing shortage of skills are specific skilled occupations, engineers are one of the two identified key skill shortage professionals, along with healthcare professionals (MAC, 2013).

The urgency of addressing the skills gap to boost the economy and enable economic recovery has further increased since the outbreak of the pandemic in early 2020. On 30 June 2020, the UK Prime Minister announced the '*Build, Build, Build'* policy plan with the view to boost construction development to initiate economic recovery. This briefing also stated the Government will bring forward the English Devolution and Local Recovery White Paper, detailing how the UK government will partner with places across the UK to build a sustainable economic recovery, launch the National Infrastructure Plan and legislate for wider de-regulatory reforms at the later of the year (UK Government, 2020).

With this in mind, it means there will be a further increase in the demand for construction and infrastructure engineering professionals, with relevant and specific skill sets. Even in the normal times, skills play a key role in contributing to and sustaining a prosperous economy and an inclusive society. Improvements in skills can directly uplift workers' productivity and hence boost growth, wages, and consumption across the economy. This need has become even more vital in the current situation due to the necessity for supporting post-pandemic economic recovery with the pressure of the existing skill shortage of construction professionals. With the collective needs of these demand, the requirement for lifelong learning has even become more important to drive economic growth and recovery (Foresight, 2017).

The aim of this paper is to discuss the recent re-development of the postgraduate programme to address the skill shortage of built environment professionals and create opportunities for further learning opportunities for adults. This case study is a postgraduate taught degree course in Civil Engineering and Construction Management delivered in a modern university in the Midlands, UK.

2. Skills mismatch

Campell (2016) defined 'skills mismatch' as a misalignment between the supply and demand for skills, which occurs when the volume and type of skills available do not match those required by employers. These mismatches result in both surpluses and shortages of specific skills.

The UK has a large mismatch between the supply and the demand for skills. Skills utilisation is high in the UK while at the same time there is shortage of some specific high-level skills. More than half of the UK workforce, i.e. 51% of employees, report having skills levels that are higher than needed to do their current job, ranking the UK the second highest in the EU for skill under-utilisation (Cedefop, 2014). This shared the same finding as employers' surveys which suggested a substantial proportion of jobs, i.e., 22%, do not require education based beyond compulsory schooling (OECD, 2012). It has indicated that an estimate of 50% of British graduates are employed in non-graduate roles (CIPD, 2015 and ONS, 2013). This mismatch implies that the education providers are not offering, or not offering the type of courses or delivery mechanism which appeal to students. This mismatch on the mode of delivery, for example. students prefer online study while all courses are delivered on-campus. Another example is the size of credits some students would prefer to study for 20 credit modules with the aim to upskill a certain aspect of their knowledge while all the courses are available as at least university certificate level, which is equivalent to at least 60

credits. It can also be the case that students are not selecting the courses that match with employers' skills needs or demand (Foresight, 2017).

Another consequence of mismatch skills is 'low skills equilibrium', which occurs when the availability of low-skilled jobs is matched by a low-skilled workforce, such that workers have limited incentives to gain higher skills, or to remain in the same employment if that is possible. Employers must adapt but are constrained by the limited skills supply. On the contrary, if only the supply of skills improves while the demand remains the same, it will create skills surplus and skill under-utilisation. It would require close partnerships between employers and providers of education and training to avoid mismatches, or improved infrastructure to facilitate longer commuting distances (Foresight, 2017). In other words, education providers must work closely with HEIs to develop suitable courses and mode of delivery which appeals to potential learners.

Skills are vital for individuals to seek employment. Almost every form of employment draws on workers' skills. Based on the survey conducted by the UK Commission for Employment and Skills (UKCES) in 2014, which gathered data from companies that recruited each type of education leaver in the previous 2 to 3 years, 36% of employers reported that 17 to 18-year-old school leavers in England are poorly prepared for the workforce (UKCES, 2014). Poor work-readiness has lasting negative effects on the young individuals in their later life, such as working in lower-paying jobs, having a higher probability of unemployment and higher levels of mental ill-health (Bell and Blanchflower, 2011 and Strandh *et al*., 2014). It leads to the conclusion that activities, such as future development of employees, are required to avoid unemployment, underemployment and low-skills equilibrium as stated in the previous paragraph. Alternatively, it has the situation that high skills jobs are available but there is a lack of skills labour to fill these roles, which hinders economic development.

In recent years there has been a trend towards learning in non-formal and informal environments, including at home, online and in informal work settings. The pandemic has changed the operation of the society in different way and has further encouraged the use of online environment. Since the pandemic, there are unexpected changes in the labour market since there is an increasing degree of digitization, the need to work remotely, and the pace of automation. It led to substantial job losses in some sectors, such as. high street retail while there is also an increasing shortage of skills workers in some other sectors, such as, supply chain, logistics and hospitality. Technology trends and changing business models have offered different types of access to education. Between 2005 and 2012, there was a shift from formal to informal learning for adults aged 55 and over. The number of adults who are aged 19 or above in Further Education in England have decreased from 3.2 million in 2011/12 to 2.3 million in 2015/16 (SFA, 2013 and DfE, 2017). The number of UK undergraduates, including full-time and part-time, aged 30 and above, has declined from 496,325 in 2005/06 to 256,440 in 2015/16 (HESA, 2007 and 2017). Therefore, it is another reason for the need to develop flexible learning for adults to address the skills gap.

3. UK government policy on enhancing flexible learning

The UK government policy on offering flexible adult learning has been the focus of recommendations stated in Augar Reports (2019 and 2021) and Skills for Jobs White Paper (DfE, 2021).

The UK economy has faced significant change over the decade, as the necessity of addressing the impact of unprecedented global pandemic and delivering on new opportunities after Brexit. The UK government has also declared the ambition to commit to achieve net-zero carbon emissions by 2050. There are increasing technological advances in general, it is logical to utilise the benefits from advanced technology to enhance the capability of the workforce. The UK government has recognised education and skills are crucial to respond to the changes. One of the strategies is to improve teaching and learning using digital and blended learning and make it more accessible and inclusive, especially to upskill the existing workforce to support achieving the net-zero goal. Despite the government's measures including offering substantial funding to increase the supply of workers and develop new skills programmes, such as T-level, apprenticeships, and skill revolution training to address the government target of achieving net-zero by 2050. However, it still may not be prompt enough to support the achieve the net-zero target (Richardson, 2021 and Weir. 2021). Therefore, it is vitally important to reform the adult education system to offer more flexible delivery of high-quality world-leading technical skill enhancement education.

The Prime Minister set out, in his Skills Speech in September 2021, to bring in a more flexible education system with the aim to have more flexible delivery results in more positive and tangible outcomes. The benefits are expected to bring is not only beneficial to individuals' lives, but also to the country's economy. The focus of reform is to put employers at the heart of the system so that education and training leading to jobs that can improve productivity and fill skills gaps. The other benefit of the flexible delivery learning mechanism is to address Registration Condition B3 of the Office for Students' Institutional performance measures with the focus of enhancing inclusivity and diversity in higher education (OfS, 2021a).

The change of the number of students to access to higher education in 2018-2019 was less than +/- 10% for the 321 UK higher education (HE) providers. However, the change of the number of full-time and part-time students entering higher education is more substantial, with number of full-time undergraduate students increased from 410,000 students in 2014/15 to 441,210 in 2019/20 while the number of part-time students has decreased from 100,000 students in 2015/16 to 73,550 students in 2019/20 (OfS, 2021b).

The change in student continuation rate between 2018/19 and 2019/20 for 295 HE providers studied in this period is only at a range of +/- 2.5%. However, the change continuation rate for students with different characteristics is considerably higher. For part-time students, their continuation rate increased from 63% for those entering HE in 2013/2014 to 67% in 2017/18 while it has remained at 90.1% for full-time students entering, HE at the same period. The gap in continuation rate between young students (those aged below 21) and mature students (above 21 years old) has been consistently high and has widened in recent years increasing from 7.1% in 2014/15 to 8% in 2018/19 (OfS, 2021b).

The student attainment rate has been increasing from 2018/19 to 2019/20, with 86.1% of the 208 HE providers reporting an increase during this period, from 0% to 5% in 2018/19 and followed by a change of 5% to 10% in 2019/20. Approximately 29 providers have an increase of 10% or higher attainment rate during the same period. However, it is a different story for students with different characteristics. It is consistently lower for part-time students, that is 55% and 58.9%, and 77% and 83.4% for full-time students in 2015/16 and 2019/20 respectively. Despite the attainment gap for young and mature students has been narrowed since 2014/15 at 10.2%, it remained at 9.6% in 2019/20.

Please see Table 1 to Table 3 for further details on students' access, continuation rate and attainment rate.

Insert Table 1 here

Insert Table 2 here

Insert Table 3 here

Despite the gaps between students with different characteristics, such as full-time and part-time, mature and younger students have become narrower from 2014/15 to 2019/20, there is still a gap. It is hoped the provision of a flexible learning approach can further reduce the differences.

The core of this flexibility system is to move towards modularisation of higher education with the aim to provide more opportunities to upskill on-the-job professionals throughout their careers. Augar (2021) stated there is a need for universities and colleges to provide modular offers. Augar review also emphasized the offer of learning to students must have a strong link between education and jobs, in other words, it will give the learners the best chance of securing future employment that aligns with the need of the economy. These focuses have enabled to address the concern of the skill mismatch and skill shortage as discussed in Section 2 of this paper.

Another focus of the adult learning reform recommended by Augar Review is to make technical education an attractive choice and achieve a rebalance of academic to technical education. The UK skills system has been effective at producing graduates but less suited to helping people achieve good quality higher technical skills. In the UK, there are only 10% of adults aged 20-45 who hold higher technical qualifications, i.e., Level 4-5 as their highest, as compared to compared to 20% in Germany and 34% in Canada (Augar, 2021). There are currently significant skills gaps at higher technical levels in professions such as technicians and engineers etc. to meet the many vital challenges we face, such as building the UK's green economy agenda and achieving net carbon zero emission by 2050 (DfE, 2021).

One of the main recommendations for Augar Review is to make technical education a more appealing alternative to academic education, which is through the creation of a system stimulating the demand for technical education, improving the nation's skills, and encouraging growth. To achieve this, the government has reformed skill funding, with the commitment of investment of a £400 million increase in funding for 16-19 years old at Spending Review 2019, and a further increase of £291 million at Spending

Review 2020. As mentioned in the Higher Education Reforms on the plan to support reforms to technical education, the government has announced additional funding in the 2020 budget, including £1.5 billion for upgrading existing further education estate in England as announced, up to £290m for Institutes of Technology and £2.5 billion for a national skills fund to help adults and employers to access training (DfE, 2020). It aims to improve higher technical education to help people train or retrain for high-skilled jobs to support learners studying for higher technical education qualifications.

Another new funding system for technical education is called Lifelong Loan Entitlement, the equivalent of four years of post-18 education from 2025, which aims to provide loans for learners to achieve a higher technical course as it is for a full-length university degree. The skills reform also involves investing in higher-level technical qualifications that provide a valuable alternative to a university degree. It aims to ensure the public and those from diverse backgrounds can access training and learning flexibly throughout their lives and are well-informed about what is on offer through great career support, which will further enhance inclusivity.

The government's investment in enhancing technical skills has further addressed the concern of low-skills equilibrium in the UK and the proposal from Augar Review provided a potential solution for it. This proposal has been made timely as the skills enhancement is important for post-pandemic economic recovery.

There is a clear need for enhanced skills to reduce skills mismatch and increase economic development. One of the most feasible approaches is to offer flexible learning to adults as it creates a platform for upskilling most of the working population. This idea has been the focus of the recent government adult education policies development. The aim of this paper is to discuss the re-development of a suite of postgraduate courses on addressing this agenda by offering modular learning and delivery through a blended learning approach using digital technology. The research objectives of this paper are listed as below:

Objectives

1. Identify benefits of online courses which offer flexibility to address skill shortage
2. Discuss the structure of the re-developed postgraduate Civil Engineering and Construction Management programme
3. Identify the subject areas that should be included in the curriculum to address skill shortage
4. Identify lessons learnt on re-developing an existing course from on-campus to online course delivery

4. Research Method

This paper has adopted an insider action research and case study approach as research methods. The case study is to explore and investigate the development of postgraduate Civil Engineering and Construction Management programmes in a modern university in the Midlands of England, to address the need of offering flexible future learning opportunities for built environment professionals. The rationale for the choice of this research method is driven by the nature of the project. Action research aims to rethink the nature of inquiry and who participates in it. It is a methodological

strategy that assesses an issue requiring intervention for improvement. Participation Action Research is a form of collective inquiry undertaken by the people that the issue directly affects. (Higgins, 2016; Serpal *et al*., 2018 and Sosnowski *et al.,* 2022). For the current project, it is an insider, also a researcher, to evaluate initiatives within an organization where she works at. The author' insider knowledge of the organization has provided relevant context in this research.

4.1 Insider research

Insider research is undertaken within an organisation, group, or community where the researcher is also a member (Brannick and Coghlan, 2007; Hellawell, 2006; Hockey, 1993; Mercer, 2007; Trowler, 2011). Insider research within higher education contexts carries many benefits, yet confronts the researcher with multiple challenges, such as unconscious bias in making conclusions of research findings due to existing understanding of the issue and ability to gain access to confidential information which may otherwise not available to outsider researchers (Fleming, 2018). On the other hand, Smyth and Holian (2008) stated that the benefits of insider research as 'the researcher and an insider, immersed, embedded, and strongly connected with both the setting and those being researched in a shared setting where they operate together in an ongoing basis' (p. 34). More specifically, insider research in work integrated learning is often done to improve practice through understanding, influencing and changing the direction and position of others. The insider researcher who conducts the research has the dual roles of being a staff member and an insider, opens numerous opportunities that can have a significant impact on the individuals involved in the research and create opportunities enable contributions to knowledge, meaning and understanding that is directly related and relevant to practice. There is a limitation for insider researchcaused by role conflicts. The researchers may have unconscious biases towards the interpretation of the research findings. Also, research participants may see the researchers as advocates for the research topic which may impact their freedom to express views during the research process (Bonner and Tolhurst, 2002).

4.2 Action research

Action research was developed by Kurt Lewin (1890-1947) which emphasized the focus is on developing efforts for change in the group and actions, which challenge group norms and processes to create a change process over organizational issues directly experienced by practitioners. Lewin claimed that action research should produce real change and not just end up in books (Lewin, 1951).

Action research is a family of research methodologies that pursue action (or change) and research (or understanding) at the same time (Dick, 1999). The learning acquired from action research aims to solve an organisational problem, to take forward and deepen the organisation's understanding of itself. The context of action research is almost always the organisation, and most action research studies are case studies. Action research is often linked with a change agenda, via the creation of deeper knowledge and understanding about a particular social or organisational issue, to improve a particular situation (Anon, n.d.). The key limitation of action research is the

restriction on generalisability of the research findings. The research findings from action research project can only be applicable to the environment on which the research project occurred and cannot be generalised or repeated widely (Coghlan and Brannick, 2010 and Reason, 2006).

4.3 Insider action research

Insider action research is centred on the process when a member of an organisation undertakes an explicit action research role in addition to the normal functional roles they hold in an organisation. The researcher is already within the system rather than enters the system and remains only for the duration of the research. Real-world work-based research is relevant and important to many full-time managers, consultants, and members of organisations. Over the past 20 years, action research and insider action research have become established and accepted as 'real' and credible forms of research in business and organisations (Holian and Coghlan, 2013).

The core elements of insider inquiry are pre-understanding, role duality and managing organisational politics (Coghlan and Brannick, 2010). They can be advantageous and also challenging to insider action research. At the next paragraphs, it will discuss the advantages and the actions required to address these challenges.

Pre-understanding refers to people's prior knowledge, insights, and experience and in particularly relates to the tacit nature of organisational culture and the significance and relevance of these information to an organisation, which may be invaluable to the study (Roth *et al.,* 2007). Apart from assessing formal and publicly available information such as an organisation's mission statement, goals, assets, resources, annual reports, and other documentations, insider researcher also have access to informal information which can only be experienced as an insider, such as culture, norms, traditions, power struggles and emotions, which provides a stark contrast to the formal rational perspective outwardly displayed, and may paint a different picture of the organisation and the research object. The challenge of holding this information as an insider researcher is how to distance from it, how to not to have an unconscious bias when conducting research (Holian and Coghlan, 2013 and Teusner, 2016). Insider researcher can also have the risk of being 'too close' to the data, assuming too much during the interview process and not drawing out the responses as would occur when a researcher has an external positioning (Coghlan and Brannick, 2010).

Role duality refers to the individuals' organisational role and researcher role. An employee conducts insider researcher is likely to encounter role conflict and caught between identification dilemmas (Holian and Coghlan, 2013). The dual roles also have a positive influence on the insider researcher's motivation to complete the research as the outcomes had mutual benefits, for individuals as a researcher and as an employee to drive for changes for organisation (Fleming, 2018).

Organisational politics and power mean that insider action researchers need to be politically astute in deciding the boundary and the focus of the research, in maintaining their credibility as an effective driver of change and as an astute political player (Holian and Coghlan, 2013). Insider action research may be initiated by organisational members who are at the top of the organisational hierarchy, however it can also be

bottom up, or conducted with peers (Holian and Coghlan, 2013). The level of authority and influence of an insider action researcher within their own organisation, as part of their normal work role, will impact on their access to information, opportunities to observe actions and reasons why other members of the organisation choose to participate or not participate in the research (Fleming, 2018; Hilsen, 2006 and Teusner, 2016).

4.4 Case study

Case study is the methodological approach allowed for an investigation into a contemporary phenomenon within the context of a real-world scenario (Miles and Huberman, 1994; Yin, 2013). Yin (2013) describes case study as an empirical inquiry that investigates a contemporary phenomenon in depth within its real-life context, especially when the boundaries between phenomenon and context are not evident. Case study is an appropriate research method for action research as it is always conducted within a confined environment, such as organisation setting (Carvalho, 2021). It is suitable for the research as the subject of the research is a suite of courses within an organisation. The main limitation of case study as a research method is the generalizability of the research findings, due to the data collected being from a single source (Hammersley, 2012). The author has a managerial role in the department and the case study course is within the portfolio she manages, which she has a strategic leadership role developing the portfolio and curriculum. She was initiating, leading, and managing the re-development of the postgraduate portfolio in Civil Engineering and Construction Management. The author has taken sensible measures whilst conducting action research to bring in the competitive advantage of having a pre-understanding of the organisation, role duality and managing organisational politics. She has critically evaluated the information received to ensure unbiased reflections have been developed to identify lessons on postgraduate course re-development. It also aims to identify the lessons which can be shared at an institutional level to inform future curricula of the course and the lessons learnt that the organisation could take forward and further develop institutional policy on adult and flexible learning.

The research method adopted for the insider research on the re-development of the postgraduate civil engineering and construction management is through review of relevant documents and interviews with relevant internal and external stakeholders. The review of documents aims to achieve a comprehensive contextual understanding of the developments and rationale driving these changes within the University. The interviewees include the online course director, the programme leader, and students who study the programme. Interviewees also include the employers who are also members of Industrial Advisory Board (IAB) and the representatives from relevant professional bodies which accredited the programme. The reason to interview the divergent stakeholders is to gain their perspectives and insights on the re-development of the postgraduate Civil Engineering and Construction Management course to develop an independent and objective evaluation. In addition to asking several background questions, such as how long they have been in their current role and their mode of study, all interviewees have been asked their opinion on the benefit of offering on-line courses, the structure of online learning MSc courses, and other future developments of online courses. In addition, there were specific questions asked to different stakeholders. The employers and the professional bodies' representatives

were asked for input into the further development required for the course to develop work-ready graduates. The programme leader and the online course director were asked to reflect on their experience in the development of the online version from existing on-campus course and identify if any lessons can be learnt.

Eight employers were approached and five of them agreed to be interviewed. Three professional bodies' representatives were approached and two were interviewed. Twenty students, with a mix of part-time and full-time, international, and home students were approached for an interview. Seven students agreed to be interviewed, with three males and two females, three studying full time and four studying part-time; and four home and three international students. The Online Course Director and Programme Leader also agreed to be interviewed. The interviews were conducted from January 2019 to June 2020. Content analysis was used to analyse the data. Interviewees are coded as numbering as Student 1, Student 2; Employer 1 and Employer 2; Professional bodies' representatives 1 and 2 etc. Please see Table 4 for details of the interviewees.

Insert Table 4 here

5. Research findings and discussion

5.1 Business drive for the re-development of civil engineering and construction management course

As stated in the Discipline's Periodic Review documents written in 2017, one of the strategic directions set for the Discipline in the next 6 years is the development of online postgraduate taught courses. It formulated the rationale for the development of the online version of this course. There was also discussion on further development on the offer of the Postgraduate Diploma and Postgraduate Certificate of Civil Engineering and Construction Management as standalone courses and the offer on the selection of course modules as credit-bearing CPDs. the separate stream of the re-development proposal is to offer a technical route for the current MSc Civil Engineering and Construction Management course. But these are considered as future developments, which would require further market research and evaluation of the performance of the re-development of the first stage of online course, i.e., the re-development of the current on-campus MSc Civil Engineering and Construction Management to online delivery.

The starting point of any business proposal is to investigate the market demand of the products. In other words, marketing research and intelligence is the starting point for any business development. The marketing report conducted for this course re-development proposal has identified the same and/ or similar products which are currently available in the market, their price ranges, and their unique selling points. They also offer advice on how to further identify information enhancing the attractiveness of the proposed course. One of the key findings from the marketing research is the importance of incorporating industrial stakeholders' inputs into the design and content of the course to ensure the developed course has market appeal. The ultimate purpose of offering programmes is to attract applicants to gain financial returns and market the presence of the course in national and international markets.

It has been commented that in the marketplace, there is no shortage of offers for similar on-campus delivery postgraduate diploma and postgraduate certificate courses, but none of these courses are offered online and professional body accredited. There was also exploration of the possibility of offering stand-alone credit-bearing modules. It has been commented that it would also be highly welcome as it removes barriers for postgraduate education for potential applications as the students enrol to study individual modules can see it as taster course for the postgraduate course and could encourage potential learners to continue to study for a full MSc degree. It has also been highlighted in the marketing research, that there is a higher demand for technical and specialist modules, such as Geotechnical engineering. One of the reasons is that the learners who chose to study CPDs have a specific focus on the area of professional development required. This marketing feedback has reinforced the fundamental rationale for offering these products as it addresses the government advice on offering flexible adult learning on technical subjects.

The rest of this section will present the discussion with different stakeholders which inform and shape the idea for each development. At Section 6, it will discuss the re-development of the postgraduate course in Civil Engineering and Construction Management and the learning which can be beneficial to future development of the course and for the organization on lessons learnt for flexible adult learning institutional strategy and policy.

5.2 Benefits of online courses which offer flexibility to address skill shortage

The main advantage for online learning mentioned by all interviewees is flexibility, which enables students to study remotely and fit around work and other commitments. It is particularly welcome for part-time students and from employers and universities. Employer 2 stated *'the staff who study on-campus part-time degree usually have to take a day-release to attend classes so there is a loss of one working day (and potential consultancy income) for each week for two years. With online learning, it has become unnecessary and imposes less impact on business, in terms of potential income through external consultancy work and the working day'.* The other potential benefit is that the students can save travelling time and cost if they can study online. In other words, there are no more geographical boundary constraints when students choose courses. The online course adopts an approach that all materials are pre-uploaded to VLE prior to the start of the course, it provides further advantage to students who travel extensively for work purpose and in occasions that cannot access to internet. Student Interviewee 2, who studies part-time stated that *'I can download the information of the whole module to study prior to my travel to areas which have no internet access and I can continue my study while I am, there'.* Universities welcome online delivery as geographical location is no longer a boundary, which means any students, including international students who must study in their country or students who have restricted access to premises, e.g., soldiers and prisoners, which means it can potentially increase student recruitment, and result in higher financial return, wider and enhanced international presence. The pandemic further accelerates the public demand and acceptance of online learning. Foresight (2021) stated that 22 million people across the UK took part in some form of 'lockdown learning'.

Professional body representative 1 has stated two unique features of the online delivery of the Civil Engineering and Construction Management postgraduate course. The first one is it is rare for civil engineering courses to be delivered online due to the highly practical nature of the course and subject area. Another feature is the structure of the course which consists of civil engineering and construction management. Most of the students who study the on-campus version of the course have completed a first Degree of other built environment-related courses. After they complete this MSc course, they will be eligible to become chartered engineers subject to successfully securing relevant work experience after graduation. With the international shortage of civil engineering, the opportunity to study part-time while in full-time employment can be an attractive option for on-the-job professionals who aim to upskill and widen their knowledge and seek professional chartership. However, the professional bodies' representatives also emphasized the necessity of the on-campus element for civil engineering courses due to its practical nature. Some subject areas within the curriculum, such as health and safety, can be delivered online. The other subjects, such as site surveying, which is essential to have on-campus elements for the practical experience. Some of the student interviewees, in particular the students who do not have relevant work experience, also commented that they preferred blended learning to online learning as they welcome the opportunity to have in-person interaction with tutors and other classmates.

5.3 Structure of the re-developed postgraduate Civil Engineering and Construction Management programme

Employers, programme leader and student interviewees have raised concerns on using online delivery for practical courses like civil engineering. A Programme leader stated that online delivery for civil engineering course faces barriers, such as the challenges for delivering practical sessions, such as site surveying and laboratory work, therefore he suggested the more ideal approach is to deliver in a hybrid or blended learning model to sufficiently deliver the practical elements of the course. If the course must be delivered completely online, it is vital to develop a strategy to enhance the online delivery mechanism for the practical content via the digital environment. One approach is to use virtual reality to deliver the practical elements of the course.

The Online Course Director stated that there is a standard structure for delivering all online modules to give a sense of consistency to students. The content of the online course materials was authored prior to the start of the course. The interactive element is in the form Discussion Board within the Virtual Learning Environment (VLE) platform. There is also a consistent structure for assessment strategy for all modules of a course. Some students, especially the part-time students who have relevant working experience, found this consistent structure is useful and easy to navigate. The course materials are available online at the relevant VLE platform at the beginning of the course. It is particularly convenient to students who may not have continuous internet access throughout the course as they can download the whole module at the beginning of the course. On the contrary, the programme leader, professional body representatives and students who do not have relevant work experience, stated their

preference for live lectures and instant interactive opportunities with tutors and other students is vital to their learning experience. The programme leader summarised the significance of both types of delivery as students' learning styles are different and their experience also varies. The incorporation of both styles can complement each other and offer students more comprehensive learning experience. Professional body representative 1 raised the concerns that delivering learning materials in both styles may impose an excessive workload on students as they may feel they are obliged to learn through both approaches. It also increases the workload to the academics as they need to produce similar if not the same materials in two styles.

The Online Course Director commented on the importance of scaffolding of the course to fit students' need and industrial demands, which is including the offer of individual modules as micro-credentials, Postgraduate Certificate, Postgraduate Diploma and MSc Degree. He also suggested the development of top-up undergraduate degree to enable graduates of HND, HND and Foundation Degree to continue studying to gain undergraduate degree level. This comment echoes marketing research finding that the offer of stand-alone credit-bearing modules is also highly welcome as it removes barriers for postgraduate education for potential applications as the students enrol to study individual module can see it as taster course for the postgraduate course and facilitate potential learners to continue to study for a full MSc degree. This comment reinforced one of the marketing research findings that the offer of the postgraduate qualifications in the scaffolding approach addresses the government advice on offering flexible adult learning on technical subjects.

The programme leader and student interviewees also welcomed the offer of the Postgraduate Diploma, Postgraduate Certificate, and individual modules as standalone awards. They understand there are skill gaps of colleagues in their work environment, and they realize the offer of these standalone credit-bearing courses will enable them on targeting upskilling. The programme leader, who is an assessor for chartered engineers and committee member of civil engineer professional organizations, has witnessed in first-hand there is a market demand and gap for civil engineering subject specific CPDs.

5.4 Subject areas which should be included in the curriculum to address skill shortage

It is important to consider the subject areas which should be included in the curriculum to address skill shortage. One of the key areas to consider for future curriculum development is to incorporate sustainability, such as carbon footprint and carbon accountancy, throughout the curriculum. Apart from sustainability being a significant issue nowadays, it is also driven by the accreditation requirement of professional bodies. Buildings generate nearly 40% of annual global greenhouse gas emissions (GCB, 2021), there is a lot of scope for construction and civil engineering sectors to reduce carbon emissions. For example, identifying new way to manufacture concrete to reduce energy involved in production, the design of roads to enhance the efficiency of road traffic and developing an alternative approach to use concrete for capturing rainwater. This comment echoed the finding of the market research conducted as part of the business case development for the re-development of this case study course portfolio that specialist engineering modules should be the focus of CPD development.

The technical civil engineering modules within the current curriculum are Flood Risk Engineering Management, Transport Infrastructure Engineering & Sustainable Design, Geomatic Monitoring & Asset Engineering and Advanced Geotechnical Engineering. They are modules considered suitable to include as standalone CPD modules for the development of micro-credentials. Employer 3 also commented that it would be a good idea to develop the undergraduate level's technical module, in the subject area of Geotechnics through online delivery mechanisms as it offers great development opportunities for on-the-job engineers who just require training in a particular specialist subject area in order to qualify for Chartership.

Professional body representatives also welcomed enhancing the technical aspect of the course by adding the Geotechnical module within the curriculum. The offer of the Postgraduate Diploma, Postgraduate Certificate, and standalone modules as CPDs as these initiatives embrace the supporting their members to engage in further learning, which also aligns to the UK government's further learning and skill enhancement policy.

The programme leader and student interviewees shared the same view and stated the importance of the creation of the technical route for MSc Civil Engineering and Construction Management. The students, especially the part-time students, commented that the opportunity to study the technical route of this course will add value to their current role and the projects at which they are working. The programme leader also commented that the development of the technical route will be incredibly attractive to home and international students.

Another important subject area to include in the curriculum is business and management-related subject areas. After all, civil engineering and construction projects' value are multi-million pounds and it is important to equip the students on financial management and awareness. The areas to be considered include whole life cycle costing, risk management, project management, and building information management. In addition to that, it is also important to have a balance consideration of the technical knowledge and skill development within the curriculum to support students who would prefer to develop their career in technical specialist pathway. Employer 5, whose business is focused on site surveying, emphasized the importance and suitability of short courses for working professionals' professional development as it has the flexibility of delivering specific and short training. The type of course is required by the market is 3D CAD modelling as there are growing number of projects require this skill while the supply of skilled professionals in this area is rare.

One of the key contributors to successful contemporary curriculum development is to have inputs of professional bodies and employers at the development stage as they have an acute awareness of the industry requirement of competencies and knowledge requirement of the workforce. The programme leader stated that there is a constant evolution of curriculum required to keep it current. For example, the traditional approach to do measurement and bills of quantities for quantity surveying was paper based, and it is now widely computer based. The curriculum must change to reflect the current practice in the industry. Employer 3, who is also member of the School and College's Industrial Advisory Board has summarised the significance of employers

input by stating '*we are in competitive market, we really need to be in touch with each other to thrive'*.

5.5 Lessons learnt on re-developing an existing course from on-campus to on-line course delivery

The re-development of an existing course from on-campus to on-line course delivery is a cooperation between two departments, which is the department which owns the course and the online learning department. The online learning department reviews the existing programme structure, investigates the time required for developing the existing programme to become an online version and considers the time required for the marketing of the new course.

The approach to delivering online and on-campus is different. The online learning department has a well-developed structure to present the learning materials for all modules. In addition, the digital design team is to provide support to accelerate the overall presentation of materials, which is particularly beneficial to the learning experience of online students who have less interaction with their tutors. Most of the teaching materials have been authored prior to the start of the delivery of the module, while academics delivering on-campus usually develop the materials throughout the delivery of the modules. Therefore, it is important for both the online curriculum development team and the academics to communicate and gain mutual agreement on the approach during the development stage. There is also consideration required for the technical aspect of online delivery. Specialist software is required for students to use as part of the course, it is essential to check the licensing requirements if they are used through online platform only. The other aspect is about the incorporation of the practical elements virtually on the online content. As mentioned by professional body representatives, civil engineering and construction is a highly practical course. Incorporating a residential element for certain modules for which in-person practical experience is essential, but it should not be excessive as the one most important selling point for online courses is that students can study without geographical boundaries.

It is also important to consider the comparable student experience for online and on-campus students and assurance of academic rigour for online delivery. The interviewed programme leader, who is an experienced on-campus academic, stated that it is essential to offer the online students the equivalent practical experience as they are vital elements for civil engineering and construction courses. He also raised concerns on the assessment for online students, in particular, how to ensure the students conduct closed-book examinations on their own without any aids. It is a requirement for the civil engineering professional accreditation bodies that examination is required for all accredited degrees so measures to address this concern is vital to the development of the online course.

Please see Table 5 for summary of research findings.

INSERT TABLE 5 HERE

6. Re-development of postgraduate course in Civil Engineering and Construction Management

This section discusses the re-development of postgraduate courses in Civil Engineering and Construction Management reflecting on the research findings of the discussion with relevant internal and external stakeholders, which can be a useful reference for institution's development of future adult learning initiatives. The reflection process is a significant benefit and unique feature for insider action research. As discussed in Section 4, one of the positive influences of insider research is that the outcome of the completed research has mutual benefits to the individuals as a researcher, but also offering insightful information for an employee to drive for changes for organisation (Fleming, 2018). This paper also used action research method which focuses on developing efforts for change in the group and actions, challenge group norms and processes to create a change process over organisational issues directly experienced by practitioners. The ethos of action research is to pursue action (or change) and research (or understanding) at the same time (Dick, 1999). It is particularly timely to discuss the reflection of the re-development of the postgraduate courses with the focus on the UK government's policy on enhancing offerings of flexible learning for adults (Augar Review, 2019 and 2021; DfE, 2021). The reflection and learning from this development can inform the development of institutional policy on responding to government initiatives, which aligned with Lewin's idea (Lewin, 1951) on action research, which should produce real change and just not end up in books.

The project scoping process for the course re-development scoping started in 2018 with the approval of the launch of the online version of MSc Civil Engineering and Construction Management course with the first intake from September 2019. It is a response to address the increasing demand for informal learning (SFA, 2013 and DfE, 2017).

The design and professional accreditation of the course have been carefully considered to maximize the appeal of the course to potential applicants and address the skills mismatches issue (Foresight, 2017). The course covers civil engineering and construction management disciplines, and it has been accredited by the Joint Board of Moderators (JBM) which represents the civil engineering professional bodies and the Chartered Institute of Building (CIOB) which is an international construction management professional body. This course is one of the two Master's course with civil engineering focus in the UK that has received the professional accreditation status from CIOB. The uniqueness of the course and the dual accreditation has been a unique selling point of the course which has become popular in the UK and overseas markets.

This course has been well-received by national and international applicants since its launch in September 2019. Since the pandemic, from early 2020, online learning has become a dominant platform for learning which has further driven the demand for the course. Also, with the increased boost of the infrastructure and civil engineering sector as part of post-pandemic recovery, the workforce currently employed in this sector has become more interested in upskilling and gaining formal qualifications. In combination, a version of the course is being delivered online and geographical boundaries are no longer an issue, the student numbers of the course have increased rapidly, for both national and international applicants. The dominant proportion of online students are

international students. More than 80% of the students who are currently studying the online version of the MSc course are international students.

With the success of the launch of the online version of the MSc course, underpinned by the positive comments from the interviews with the stakeholders, the department has continued the development of the postgraduate courses in Civil Engineering and Construction Management. With the government's focus on flexible adult learning, building and technical skills development are seen as crucial elements for post-pandemic recovery, a second phase of the re-development is designed to address this government focus.

The second phase of re-development consists of three areas. The first area is to offer a Postgraduate Certificate and Postgraduate Diploma of Civil Engineering and Construction Management, on-campus, and online deliveries, as part of the University's plan in studying for micro-credentials This offer has addressed the demand of professionals who may want to study several modules for the requirement of their professional bodies. The second area is to offer civil engineering-focused modules as standalone CPD modules at both online and on-campus modes of delivery. The offer of standalone CPDs at postgraduate level is to align with the government initiative supporting flexible learning for adults through modular delivery stated in Augar Review (Augar, 2021). This offer also provides a platform for built environment professionals to enhance future skills through studying bite-size credit-bearing lifelong learning opportunities. As stated in the Future of Skills and Lifelong Learning report published by Government Office for Science (Foresight, 2017), skills shortage and skills mismatch have imposed barriers and implications for the workforce and economy in the UK. The third area is curriculum enhancement. for the MSc civil engineering and construction management and includes a technical route, which is to include an addition of two civil engineering specialist modules in the curriculum. This change is complementary to the existing non-technical route of the accredited course. The addition of the technical route of the accredited course is to offer flexible and wider choices in learning, employment prospects and appeal for potential students. It also addressed government's focus on balancing technical education and academic qualification as students studying technical MSc course would require to final year project which has technical focus.

The initial impact of the second phase of re-development of the postgraduate course in civil engineering and construction management, has been reflected in the number of student applications for September 2021, has increased more than four times as compared to the first intake in 2019. Another reflection is the choice of appropriate timing for the launch of the second phase, which is to address the government initiative on developing adult learning skills and 'Build Build Build' agenda to support the recovery of the post-pandemic economy (UK Government, 2020), it is a good time to launch these adult development initiatives. All offers in the second phase of re-development are delivered through on-campus and online modes, enhancing their attractiveness. Digital technology has been improving and online learning has become more well-developed because of the pandemic, it has further enhanced the attractiveness of online delivery, which will also boost international students' application for these courses. The offer of flexible learning will also address another key government agenda on enhancing inclusivity and diversity in higher education which is part of the OfS institutional performance indicator (OfS, 2021a).

There are also lessons for the institution on future development regarding re-developing the current on-campus course as online course. There is a great deal of consideration required as the student's learning environment is different. Furthermore, the pedagogy for on-campus/ blended and online learning is different. In the online learning environment, teaching materials were uploaded to the VLE prior to the teaching period. The dominant learning mechanism for students is through reviewing the published materials online, supported by Discussion Boards and live lectures. In other words, the teaching materials must be all written up and developed prior to the start of the teaching period in a clearly self-explanatory manner. It requires more logistical coordination and organization as compared to on-campus delivery, which can provide real-time explanations to students. It may be a new concept for teaching preparation for on-campus academics and they may find it a steep learning curve. Furthermore, it is also important to consider developing a schedule for updating the content for online teaching materials to keep them updated.

A further course development business opportunity that arises from this re-development of postgraduate course is to consider the development of the online version of the undergraduate civil engineering and construction management courses, which was suggested the Employer 3. Technical-focused professional accredited courses have always been popular for UK and international students. It is getting even more welcome due to the UK government policy supporting adult technical learning. Online delivery offers flexibility for students from other countries, they can study the course and gain qualifications while remaining in their countries. It is worthwhile to consider the development of online civil engineering and construction management top-up undergraduate degree courses. There is always a high demand for top-up degrees from practitioners who have completed HND, HNC or Foundation Degree, especially the professionally accredited degree which can lead to a career as a chartered engineer or construction manager. The offer of the online version of the undergraduate degree can widen this opportunity to international applicants and also UK applicants who are not able to attend the course on-campus. It is also worthwhile to offer the undergraduate modules as standalone CPDs. It is common for civil engineers to have a knowledge gap of some areas of specialist knowledge to enable qualification as Chartered Engineers. The offer of the individual modules as CPDs can bridge this gap. The offer of undergraduate modules can also further enhance the market presence of this civil engineering course in the UK and international markets. Finally, it is also important to have a holistic review of the curriculum to consider whether there is a need to revise the management and business subjects within the curriculum. The current curriculum does not include the business-focused modules and other skill-focus modules, such as 3D CAD modelling. It is acknowledged from the employers' comments the importance of incorporating these elements into the curriculum. However, there is credit limit on the number of modules can be included in MSc course. An option to respond to this is to offer various pathways of the Civil Engineering and Construction Management Degree, for example, with a focus in business, management, and technical aspects.

7. Conclusion

This paper has discussed the re-development of postgraduate course in Civil Engineering and Construction Management. The research method for this paper is insider action research and case study. In addition to reviewing relevant documents, internal and external stakeholders including programme leaders, online course director, students, employers who are also IAB members and professional bodies representatives were interviewed to gather their perspectives and views on the re-development. The benefit of the approach used for this paper is to maximize the benefit of being an insider researcher, with the familiarity of the context surrounding the researched issue, develop efforts to create a change process over organizational issues, and produce real change.

The re-development of the postgraduate course of Civil Engineering and Construction Management has consisted of two phases. The first phase is the development of the online version of the course. The second phase is the further development of the course to align with government initiatives on adult learning, i.e., the development of the Postgraduate Diploma and Postgraduate Certificate of Civil Engineering and Construction Management and the offer of individual modules as micro-credentials. With the online and on-campus delivery, the offer of bite size learning, such as a single module to study the whole master's degree and the option of scaffolding the learning and building on credits throughout the study journey. The re-developed postgraduate course of Civil Engineering and Construction Management has embraced the idea of flexible learning and provided a solution for the skills shortage concern for built environment sector.

The reflection and learning of the re-development of the postgraduate course in Civil Engineering and Construction Management can provide strategic insights and intelligence for organisations to further develop technical courses development strategy. At the departmental level, the identified future improvements are the development of the on-line version of the top-up degree in Civil Engineering and Construction Management and the offer of level 6 civil engineering modules as standalone CPDs. This development can also benefit from the Higher Technical Qualifications, with the first approved qualifications available to be taught from September 2022 and followed in 2022, including construction and engineering respectively (ESFA, 2021).

The suggested future research area is to further evaluate the change of the postgraduate Civil Engineering and Construction Management course by studying what happened on the students' future skills development and its impact on their employability. Another area of the proposed future research area is to develop a longitude study to identify the change of student number, the uptake of different offers within of the postgraduate courses, i.e., MSc, Postgraduate Diploma and Postgraduate Certificate, online vs on-campus and various modules to inform the further refining the future development of the PGT portfolio. Another suggested future research area is to conduct a wider empirical study on the development and re-development of various postgraduate courses and identify various lessons learnt from the process which can be implemented in higher education reforms.

The implication for practice from this research is that it identifies the approach for cooperation between online development and on-campus teaching team on the re-development of existing on-campus courses to online courses. Online learning has

always been recognized as a more flexible way for working professionals to upskill. In recent years, it has also become the centre of the UK Higher Education Policy due to the government's focus on technical skills reform. Re-development of existing courses could be a strategic approach for the course providers to capitalise the UK government funding initiatives on offering flexible technical education for working adult. As the on-campus courses are existing courses and the curriculum has been developed, the time required for re-developing to online delivery is on creating an online delivery platform. It can be an ideal approach to respond to government funding initiatives that already has announced plan on a funding plan.

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