Microlearning in Technical and Vocational Education and Training (TVET): A Case Study during the COVID-19 Outbreak in Hong Kong

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Abstract

Purpose – Technical and vocational education and training (TVET) is expected to play a crucial role in the sustainable development of tomorrow's knowledge economy, as it empowers individuals with skill-development, and promotes employment through offering an alternative educational pathway. The recent COVID-19 pandemic has presented challenges to Hong Kong's TVET teaching staff, including that campuses have been closed, removing face-to-face instruction options. However, this crisis situation has also presented unique opportunities to create a "tipping point" or conditions that foster innovative teaching practices. In light of these developments, a new form of e-learning, microlearning, has recently been explored by a Hong Kong TVET institution. Microlearning offers learning opportunities through small bursts of training materials that learners can comprehend in a short time, according to their preferred schedule and location. Originally considered as "add-on" complementary online learning resources, to provide learners with an active and more engaging learning experience through flexible learning modes, the possibility of an institution-wide implementation of microlearning has been further explored during the COVID-19 lockdown. This paper examines the Hong Kong TVET institution's approaches to the adoption of microlearning.

Design/methodology/approach – We present a case study of a Hong Kong TVET institution's approaches to the adoption of microlearning. More specifically, a student questionnaire was used to gather Engineering students' (n=496) feedback on the microlearning experience.

Findings – Overall, microlearning appeared to be a promising direction for Hong Kong's TVET, but its current implementations face challenges and its role may remain supplemental.

Originality/value/implications – The insights gained from examining how a TVET institution can move toward adoption of microlearning, with its promise and challenges, will contribute useful knowledge to TVET and other institutions attempting a similar adoption. The strategies discussed in this paper will help Hong Kong TVET institutions to fully take advantage of the opportunities of microlearning, and to address challenges for implementation. This study will also be of interest to online delivery and flipped classroom advocates.

1 Background

1.1 Critical Role of TVET Education in Today's Knowledge Economy

The last three decades have seen radical social development with the rise of the knowledge-based economy — a model of production and consumption that is based on intellectual human capital instead of the traditional labour-intensive workforce. The global transition towards the new economic model calls for the development of highly skilled workers to fill high-wage occupations, with high and evolving demand (World Bank, 2007).

Technical and Vocational Education and Training (TVET) is expected to play a crucial role in supporting such a development. TVET can be understood as "comprising education, training and skills development relating to a wide range of occupational fields, production, services and livelihoods" (UNESCO, 2015, p.10). Traditionally, TVET emphasises the development of hands-on skills for employability. It first emerged in the context of the three industrial revolutions in Europe and North America as a realisation of the philosophy of "productivism" (Anderson, 2009) and as a means for supporting economic growth. As the TVET moves towards the United Nations' *Educational 2030* agenda (UNESCO, 2016), and prepares for *Industry 4.0* (Gilchrist, 2016; Schwab, 2016), there is an increasing emphasis on the expansion of quality educational opportunities. This can be done by empowering individuals with professional knowledge and promoting employment through an alternative educational pathway, and supporting their life-long learning to cope with the ever-changing needs of the labour market.

Because of such a vital role, the Hong Kong Special Administrative Region (HKSAR) Government put TVET as a prioritised development focus for the Secretary for Education, and formed the Task Force on Promotion of Vocational Education in 2014 (HKSAR Government, 2015).

1.2 COVID-19 Pandemic Implications for TVET Education in Hong Kong

The COVID-19 pandemic has created an unprecedented health and economic crisis (World Health Organization, 2020), disrupting the learning opportunities of many individuals. In response to COVID-19, confinement measures have been taken, and all education institutions in Hong Kong, including TVET institutions, have had to close their campuses, temporarily removing the options of any face-to-face teaching and learning activities.

While Hong Kong TVET institutions are dealing with the academic, financial, and logistical challenges and uncertainties caused by the pandemic, they are, at the same time, encouraged to move their instructions to a distance and online learning

environment, responding to the Government's "Suspending Classes without Suspending Learning" initiative (Education Bureau, 2020).

On the one hand, moving online to ensure the continuity of learning appears to be challenging for many Hong Kong TVET teachers. At the fundamental level, its feasibility is still conditioned by low levels of preparedness from various perspectives, in spite of Hong Kong's reputation as a "Smart City" (Innovation and Technology Bureau, 2017). Moreover, one of the commonly-perceived bottlenecks for TVET's move to fully online is its conventional teaching practices. The predominant delivery approaches have been rooted in skills-development for specific occupations, which requires a large amount of demonstrations, practice and interactivity to suit specific needs (Bünning, 2007).

On the other hand, this crisis situation has also presented unique opportunities to create a "tipping point" (Gladwell, 2006), or conditions that foster innovative teaching practices and revisit strategies to build a transformative learning environment that can cater to (and strengthen) the kind of learning and agility needed for the knowledge economy (Towey, Walker, & Ng, 2019).

1.2   Microlearning

There are a number of ways to reorient TVET to an online format, and address the current teaching and learning needs. One of the promising directions being explored is the introduction of microlearning.

Although there is no consensus on the definition of microlearning as a teaching method (Hug & Friesen, 2007), the term refers to putting knowledge into episodic and understandable pieces (Lindner, 2007). Hug (2005) characterized the essence of microlearning with seven markers: spending a short time; carrying less content; capable of being drawn from course elements; scattered form; coherent and self-contained; media-rich; and supportive of various learning approaches.

The emergence of microlearning is associated with the fast-moving nature and fragmentation of knowledge today. As Langreiter & Bolka (2006) described, Microlearning "reflects the emerging reality of the ever-increasing fragmentation of both information sources and information units used for learning, especially in fast-moving areas which see rapid development and a constantly high degree of change" (p. 79)

A variety of microlearning approaches have been explored by education researchers and practitioners in recent years. Example microcontent could be in the form of video presentation, audio or screen recording, or even a PowerPoint slide showing on a single and focused topic. Pedagogically, microcontent can be made for flipped classrooms, and can provide re-enforcement for student learning (Zhou & Deng, 2018). Instead of delivering a lecture in one long class presentation, the lesson material can be divided into sub-module parts (sub-topics or "chunks"), which the learners can access at their own pace through online platforms such as Learning

Management Systems (LMSs). Microlearning can also provide the students with the required knowledge and skills they need, as they discover a path in their individual life (Gutierrez, 2015). Although often used for formal curricula and highly specified learning objectives, microlearning can happen informally (Zhang & Ren, 2011). It can occur between other activities, on the move, during waiting moments — often driven by knowledge needs or inner impulses. Such impulses may be supported, or even triggered, by a microlearning system using learning pushes as a teaser to attract attention or raise interest for students' self-regulated learning (Kovachev, Cao, Klamma, & Jarke, 2011).

2   This Study

This ongoing case study (Yin, 2014) examines the approaches of a Hong Kong TVET institution (hereafter TVET Institution A) to the introduction of microlearning during the COVID-19 outbreak.

Originally, the initiative was piloted in 2015 with selected courses in TVET Institution A, as "add-on" complementary online learning resources, aiming to provide learners with an active and more engaging learning experience through flexible learning modes. The initiative also aimed to help develop lifelong learners who could respond to evolving societal needs and community demands. Since the COVID-19 outbreak, the possibility of an institution-wide implementation of microlearning has been further explored.

The ongoing investigation started with a student questionnaire was used to gather Engineering students' (n=496) user experience of the microlearning lesson. With the insights gained from questionnaire data, we reflect upon the opportunities and challenges for the introduction of microlearning in TVET. Concomitantly, we attempt to generate some possible strategies that may help Hong Kong TVET institutions to fully take advantage of the opportunities and address the challenges for implementation.

3   Preliminary Findings

The student questionnaire consisted of 13 closed-ended questions with items 1) *Accessibility*, 2) *Layout and interface*, 3) *Learning and teaching design*, 4) *Learning outcomes,* and 5) *Overall quality* on a 6-point Likert scale with 1 being "Strongly Disagree" and 6 being "Strongly Agree". In addition, three open-ended questions were used to get qualitative responses.

Responses showed that the "Accessibility" of the microlearning lesson was favoured by over half of the students (55%) and agreed that the platform was user-friendly. Only 36% of the students reported being satisfied with the "Layout and Interface". With a percentage of 64%, the "Learning and teaching design" was considered appropriate and adequate. 50% of the students found the "Learning Outcomes" barely satisfactory. The overall quality was rated 50%, while half of the students found that their practical skills were improved upon completion of the microlearning lesson.

Qualitative feedback included:
* The duration of this lesson was just right.
* I was able to access the lesson easily.
* I was able to access the videos without much difficulty.
* The all-time accessibility was convenient to my learning.
* The learning objectives were clearly stated in each video.
* The learning contents in each video were well structured.
* The learning content was effectively presented and explained clearly.
* The lesson was best for demonstration of practical skills and theories.
* The lesson presented the subject in interesting ways. My overall knowledge of this subject was enriched after taking this lesson.
* My practical skill of this subject was improved after taking this lesson.
* This lesson motivated me to learn.
* Overall, I had a good learning experience in this lesson.

As a pilot lesson, it was encouraging to see that students' tendency to use microlearning to support learning was generally accepted. More particularly, students found microlearning easy to internalise, and were able to improve practical skills by repeatedly reviewing the procedures and techniques: they are short enough for learners to consume easily, in one go; and are available to learners whenever they needed. As supplementary online learning resources, the microlearning lesson was a good start, with satisfactory results.

However, it was also stressed that the online learning could not fully replace the face-to-face lessons, partly because the content was too general for students delving into the details of the topics. The learning content could stimulate self-study, yet it was only beneficial to students at the beginner level. It was proposed to include a variety of question types on the platform. There was a lack of interaction with teachers and peers, and no instant response could be offered to students when they encountered difficulties in learning. In response to this, it was suggested that a discussion forum be added as a communication channel.

4   Discussion, Recommendations and Concluding Remarks

Given the preliminary findings of this ongoing study, we can say that microlearning appears to be a promising direction for Hong Kong's TVET. The positive feedback illustrated how the threat posed by a crisis like COVID-19 could be turned into an opportunity: the closure of the campus made online learning an indispensable TVET response to the pandemic, and subsequently removed many system-level constraints (such as policy issues) previously seen to hinder online adoptions.

While it was acknowledged that the microlearning in the current form could not fully replace the face-to-face lessons, TVET institutions needs to reflect how they can ensure microlearning be able to offer the same quality and engagement as the face-to-face teaching (e.g. how to improve interactivity). Although the current focus has been ensuring continuity of learning and making the resources available in responding the

COVID-19, the true success of microlearning should help to move the TVET education into the next level. The transformative role of a TVET institution was to create an environment that encourages students to be independent learners and to engage with the learning process. For this to succeed, the curriculum and activities for microlearning should be reviewed, and the pedagogy should be revisited to maintain a good alignment. Sufficient capacity of teaching staff is also a necessity.

To help Hong Kong TVET institutions to fully take advantage of the opportunities of microlearning and address the challenges for implementation, the following strategies are given:

First, Hong Kong TVET institutions should continue their development of content for microlearning. Keeping the practice sustainable, even Post-COVID-19, may be beneficial for the institution from multiple perspectives. Academically, it is an opportunity for curriculum review and revision, with the potential to redesign to be more flexible and blended (Oliver and Trigwell, 2005; Wang, & Teter, 2018). A flipped-learning approach (Bergmann and Sams, 2012; Wang, 2017) could allow independent study of the theories, while maintaining hands-on practices. Administratively, the incorporation of lessons learned from the COVID-19 pandemic with microlearning could facilitate a more efficient response to future unexpected events.

Second, to further enrich the microlearning resources, the incorporation of Open Educational Resources (OERs) (Towey, Ng, & Wang, 2016; Wang, Ng, & Towey, 2018; Wang & Towey, 2017) should be encouraged. Often carrying the Creative Commons Attribution Only (CC BY) or a GNU license, OERs allows users to freely retain, reuse, revise, remix and redistribute the learning resources while resting within the framework of intellectual property rights and fully acknowledged authorship (Wiley, 2014). Because of this nature of OERs, the incorporation of OER may ease the microcontent development challenges: if existing OERs can be adapted to meet the needs for microlearning, there is no need to *reinvent the wheel*.

Third, considering the skills-development nature of TVET, institutions should invest in immersive technologies such as virtual reality (VR) and augmented reality (AR) in conjunction with microlearning. These technologies, with their proven applications in military and medical training (Huang, Liaw, & Lai, 2016; Smith, 2016), could supplement the microlearning experience.

Fourth, capacity-building (Fullan, 2006; Stoll, 2009) for TVET instructors is needed to ensure that their Technological Pedagogical Content Knowledge (TPACK) (Koehler, Mishra, & Cain, 2013) are sufficient for microlearning. For capacity-building measures to be effective, they should not only be focused on the mastery of related technologies without offering convincing evidence and examples about how and to what extent microlearning could effectively support teaching and learning practices (Lim & Wang, 2016a; 2016b). One way for doing so is to showcase promising practices and suggest pedagogies that works well with microlearning.

Fifth, TVET institutions should regularly collect student feedback on their microlearning experiences. These snapshots can serve as a more valid reference for monitoring and reviewing institutions' microlearning implementation strategies.

We believe when these strategies are considered, the challenges of current microlearning implementations could be addressed, and the opportunities of this new learning modality would be realised.

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