Microlearning: A new normal for flexible teacher professional development in online and blended learning

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Abstract

This paper explored teacher professional development (TPD) for online and blended learning (OBL) via microlearning in the higher education English language teaching context in Hong Kong in 2021 and 2022. OBL requires teachers to integrate technology. This study drew on quantitative survey data ($N=67$) and interviews ($N=12$) that took place after the participants were exposed to microlearning. The findings illuminated that microlearning was perceived as flexible and stress-free and allowed teachers to focus on relevant and immediate tasks using bite-sized learning segments to achieve digital growth. Such activities created favourable conditions to equip them with the skills necessary to teach effectively in the context of the "new normal". Moreover, the study shed light on how previous TPD activities were often considered too general to improve teachers' digital competence. It concluded with a call for more research on microlearning and TPD for OBL to help teachers gain pedagogical, theoretical and practical knowledge to enhance their teaching.

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1 Introduction

Effective teacher professional development (TPD) is critical to guaranteeing the existence of highly knowledgeable, skilful and capable teachers who can respond to the challenges of the 'new normal' in education. Effective TPD can also lead to positive academic outcomes for students and improved schools (Antoniou & Kyriakides, 2013; Darling-Hammond et al., 2017). In response to the COVID-19 pandemic that began in 2020, many teachers worldwide have been obliged to teach remotely (Hodges et al., 2020). The need to re-conceptualise teaching practices and create online and blended learning (OBL) environments that are student-centred (Carillo & Flores, 2020; Moorhouse & Kohnke, 2021; Scherer et al., 2023) has caused researchers to pay attention to teachers' digital literacy (Olofsson et al., 2021; Starkey, 2020), digital pedagogy and ability to use technology. The outbreak of the pandemic made the need for TPD on technology more urgent than ever (Moorhouse, 2021).

Many institutions offer TPD before, during and after the academic year to upskill teachers. However, it is often too general and unrelated to teachers' classroom practices (McChesney & Aldridge, 2021). Instead, it is a 'catch-all', offering outdated 'spray-and-pray' models (Reimers & Chung, 2016). This type of TPD may be ineffective and fail to meet teachers' actual needs (Kohnke, 2021a; McChesney & Aldridge, 2021). Therefore, higher education institutions must provide meaningful, individually-tailored TPD opportunities to enhance teachers' digital and pedagogical skills.

Recently, microlearning has received increasing attention because it can provide teachers with the skills they need immediately (Kohnke & Foung, 2023). Microlearning refers to short-term learning activities (i.e. 1–6 min) that teach short, concise and easily-consumable segments of larger topics (Corbeil et al., 2021). It is "a form of e-learning delivered in small chunks" (Zhang & West, 2020, p. 310) that typically focuses on highly relevant and applicable knowledge and skills (e.g. a quick Google or YouTube search for how to use *Kahoot!*). As microlearning provides bite-sized amounts of information on demand and can be easily integrated into everyday activities, it supports flexibility and can meet individual learning needs and preferences (Taylor & Hung, 2022). These tools can improve TPD by offering quick training on relevant and immediate tasks – often related to applications and tools in the curriculum (Nikou & Economides, 2018) – using videos, podcasts, infographics and other formats (Reinhardt & Elwood, 2019).

Given these perceived benefits, implementing microlearning appears to be a way for teachers to acquire the skills needed in OBL. However, little attention has been paid to its role as an alternative form of TPD. To this end, this study explores the implementation of microlearning for OBL among English as a Second Language teachers at a higher education institution in Hong Kong. It also shows the potential of microlearning as a way of preparing and supporting TPD for OBL.

2 Literature review

2.1 Teacher professional development

Higher education institutions rely on TPD to keep teachers up-to-date on the latest knowledge and skills in their field (Lockee, 2021). Since the outbreak of the COVID-19 pandemic, there has been little research on the TPD that best prepares teachers for the 'new normal' of OBL. In recent decades, many TPD models and frameworks have been applied to facilitate the development of both new and existing pedagogical practices. For example, Desimone's (2009) conceptual framework presents five critical features of effective TPD: content focus, active learning, coherence, duration and collective participation. Another framework, proposed by Consuegra and Engels (2016), was built on Desimone's (2009) five core components. They add that effective TPD should include an appreciative approach based on strengths, a school-based approach based on teachers' daily work and stress on ownership based on the participants' identified needs and self-interest. Hauge and Wan (2019) also emphasised the importance of creating a culture of learning among teachers. Lim et al. (2021) highlighted two key principles to follow when designing TPD activities: establishing a professional learning community and addressing the professional development needs of the teaching staff. Microlearning can effectively achieve these two principles. Teachers are busy with instruction, preparation and grading; therefore, they need time to develop, discuss and practise new knowledge in a safe environment where they can make mistakes and receive feedback (Philipsen et al., 2019). Several studies have reported a positive relationship between professional learning communities and it leads to more effective TPD (Compen et al., 2019).

In the framework they proposed, Koellner and Jacobs (2015) divided TPD into two distinct categories: adaptive and specific models. Adaptive TPD helps to increase teachers' flexibility, aiming to make it easier for them to solve challenges in their teaching context. In contrast, specific TPD teaches particular skills or addresses how to teach a specific curriculum. The specific model is generally preferred by institutions when implementing TPD programmes because it is easy to measure quantitatively.

2.2 Professional development for online and blended learning

The COVID-19 pandemic has further accelerated the demand for OBL as institutions worldwide were forced to move from in-person to online teaching (Hodges et al., 2020; Moorhouse & Kohnke, 2021). Because educators have to teach online using virtual learning environments and learning management systems, the need for TPD has become evident.

Transitioning to OBL requires teachers to adopt new attitudes and acquire new skills and knowledge (Rasheed et al., 2020). It also affects their beliefs about teaching and alters their pedagogical roles (Taghizadeh & Hajhosseini, 2021). Studies have shown that educators only incorporate technology and digital pedagogy into their teaching if they have a comprehensive understanding of them (Chiu & Churchill, 2016; Kohnke, 2021a) which aligns with their concept of effective teaching (Ertmer et al., 2015).

Although higher education institutions still aim to develop teachers' digital pedagogical skills, TPD activities tend to focus on the use of technology rather than its pedagogical implications (Tondeur et al., 2015). However, teachers' pedagogical beliefs determine how they use technology in the classroom (Eickelmann & Vennemann, 2017). Therefore, existing TPD for OBL that does not bring about positive changes in teaching practice should be replaced by differentiated training that considers the knowledge and skills of individual teachers.

Recently, there have been increasing calls for teachers to be digitally literate (Starkey, 2020). Several frameworks for developing teachers' digital competency have been proposed. One of the best-known frameworks is the Technological Pedagogical Content Knowledge model (Mishra & Koehler, 2006), which suggests that teachers should develop three types of knowledge: disciplinary, pedagogical and technological. Another model recommends that teachers develop the following skills sequentially: (a) basic technological skills, (b) didactic technological competence and (c) learning strategies (Krumsvik, 2009). Then, they should be provided training to address technological competence, pedagogical compatibility and social awareness (Falloon, 2020).

Personalised TPD is crucial for teachers to learn to use digital technologies in pedagogically meaningful ways (Shamir-Inbal & Blau, 2022). However, although TPD opportunities for teachers have increased in Hong Kong – the context of this study – its quality and how it affects student outcomes have not changed significantly (Wong & Moorhouse, 2021). Accordingly, there is a need to explore how to develop teachers' capacity to enhance learning environments for students using technology. Such studies will lead to more tailored and relevant TPD regarding the use of technology in teaching and learning.

2.3 Microlearning

Microlearning was first introduced in the early 2000s (Hug, 2015). It is an emerging framework of learning based on developing bite-sized chunks of content and delivering them through technology. This is more appropriate for the 'new normal' of OBL than traditional TPD (e.g. workshops, seminars, short courses), which can include long, generic sessions that disrupt teachers' workflow. Today, there is a growing demand for specific, timely and accessible TBL tailored to the individual goals of teachers. Using the microlearning framework, OBL content can be delivered in small chunks – each of which addresses one learning concept – that can be accessed using technology (Zhang & West, 2019). Teachers can revisit the content anytime and anywhere according to their schedules, workloads, interests and needs, which is a catalyst for learning (Kohnke & Foung, 2023). By delivering TPD using technology that embraces multimodal features such as animated videos and infographics (Kohnke 2021b), activities can be made adaptable and flexible. Moreover, focused content that is easily digestible, attainable and organised around a single objective prevents cognitive overload, instils self-directed learning, increases motivation and maximises efficacy (Emerson & Berge, 2018).

As microlearning is an emerging methodology, there are few published and peer-reviewed empirical research papers. Instead, discussions often occur on blogs, social media, YouTube instructional videos and other less academic sources (So et al., 2018). The approach we advocate in this study, however, is systematic, context-specific and rigorous. As a clear focus on microlearning is missing from the existing literature, the current study aims to explore how it can be applied in the context of higher education English as a Second Language courses in Hong Kong.

3 The present study

Many existing studies of TPD for OBL target traditional approaches (e.g. Philipsen et al., 2019); however, studies exploring microlearning tend to be lacking from the existing literature. Furthermore, few studies examine the perceived impact of microlearning and other forms of TPD for OBL among teachers. Therefore, the present study aims to explore higher education language teachers in Hong Kong and their perceptions of the microlearning approach. Specifically, we set out to answer three research questions:

1. How do participants perceive traditional TPD and microlearning differently?
2. How do English as a Second Language teachers perceive microlearning as a form of TPD that helps them develop skills to improve learners' proficiency?
3. How useful is microlearning TPD to enhance the digital competence of teachers?

By answering these research questions, this paper aims to give teachers, researchers and those who create professional development programmes a general idea of how to provide tailored and relevant TPD for OBL using microlearning components.

The authors created several short (1–6 min), specific and easily digestible microlearning activities focused on digital competence, technology and its specific pedagogical uses. They aimed to meet teachers' actual and immediate needs, enhance their OBL skills and improve learning outcomes. The teachers could access them through a common learning management platform (see Table 1). Each topic included a video and infographic and introduced a specific digital technology.

Using a common platform enabled the teachers to access the content anytime and anywhere through a comprehensive learning resource. Each microlearning activity contained four main elements:

- Try this activity: provided specific ideas to try with students
- Getting it right: offered advice on making the most of the digital technology
- Why this works: explained the practical and pedagogical rationale for using the digital technology
- Useful websites: provided lists of online resources for extending/deepening learning.

Table 1 Sample microlearning TPD activities and topics

Digital technology (type of tool)	Example topic
Thinglink (*virtual reality & augmented reality*)	How to use VR and AR to provide interactivity and visual representation
Edpuzzle (*video creator*)	How to adapt YouTube videos with multiple choice questions for active learning
Make Belief Comics (*comic creator*)	How to create and use comics with learners
Quizlet (*digital flashcards*)	Ways to encourage students to interact in the OBL classroom; key terminology
Gimkit (*live learning games*)	Ways to use games as formative assessment tools
TinyTap (*active learning games*)	Ways to create brain teasers and blended learning activities
Podcast (*audio*)	Pros and cons of using breakout rooms, polls, word clouds, etc
Canva (*infographic creator*)	Step-by-step instructions for how to set up and make an infographic
Quizzes (*online learning/assessment tool*)	Ways to make learning interactive and fun, conduct formative assessments and assign homework

These aspects enabled teachers to gain the confidence and skills necessary to expand their OBL knowledge and abilities successfully.

4 Methodology

4.1 Research design

This study adopted a two-stage design, comprising an exploratory study with a survey and the main study, with follow-up interviews. While it could be effective to employ microlearning activities as an intervention in an experimental study and evaluate changes in OBL outcomes, this would lead to the ethical concern that microlearning would only be accessible to some participants, when it has obvious benefits for both groups (Cebula, 2018). Therefore, we adopted the current realist paradigm to explore how microlearning could work in the given context (Wong et al., 2012). In practice, we first distributed a questionnaire to acquire a general understanding of how the participants perceived TPD for OBL (exploratory study). Then, we asked participants to try the microlearning activities we had designed. We then conducted follow-up interviews to encourage them to explain and elaborate on their previous TPD experiences and their recent microlearning experience (main study).

4.2 Participants

In this study, we employed convenience sampling to identify representative English language teachers in the tertiary sector in Hong Kong. This technique is widely used

by qualitative researchers to easily access information-rich cases (Dörnyei, 2007). Sixty-seven teachers completed the initial exploratory questionnaire, of whom 82.09% were 36–50 years old and 76.12% were female. Among the participants, 64.18% had 6–15 years of teaching experience and 26.87% had 16–25 years of experience. Most participants (98.51%; all except one) had used at least one of the digital tools listed.

Twelve of these teachers were selected to participate in follow-up semi-structured interviews (main study) because they had similar levels of experience with TPD for OBL. Their demographics are outlined in Table 2. There were five male and seven female teachers. They were also selected to reflect the levels of teaching experience among the questionnaire participants, with 75% having 6–15 years of experience and 25% having 16–25 years of experience. All participants were informed about the purpose and procedures of the study and signed a consent form. They confirmed that they had accessed the microlearning activities we designed before being interviewed. Pseudonyms were used throughout the study to protect their anonymity.

4.3 Procedure

We initially sent an email to teachers at an English language centre in Hong Kong to invite them to participate in an online questionnaire as part of our exploratory study. They could complete the questionnaire using SurveyMonkey and then indicate whether they were interested in participating in a semi-structured interview. After the survey, we showed all of the participants how to access the microlearning activities using a common platform.

In the main study, we conducted 12 individual semi-structured interviews, lasting 36–51 min. The participants had expressed interest in being interviewed when they took the survey and subsequently accessed the microlearning activities. Semi-structured interviews aligned with the objectives of having participants elaborate on the

Table 2 Demographics of interview participants ($N = 12$)

#	Pseudonym	#Years of teaching experience
T1	John	12
T2	Scott	8
T3	Ann	14
T4	Patricia	16
T5	Bob	10
T6	James	12
T7	Barbara	18
T8	Oliva	12
T9	Charlotte	14
T10	Amelia	9
T11	Mia	14
T12	Michael	16

survey results and their recent microlearning experiences and thoroughly interrogating TPD for OBL based on rich and multifaced descriptions (Kvale, 2007). The first and third authors were facilitators and designed the interview guide purposefully based on the results of the questionnaire (see section "Results of the Survey and Implications for Interviews"). It included 11 main questions designed to address the three RQs. To improve credibility and dependability and troubleshoot the interview platform, the questions were expert-piloted by three experienced teacher educators (Malmquist et al., 2019). Each interview was recorded, transcribed and reviewed by the interviewees in the first member check (Merriam & Tisdell, 2016).

4.4 Instrument – questionnaire (exploratory study)

The objective of the questionnaire was to identify the general situation of TPD for OBL in Hong Kong. The questions were adapted from Kohnke (2021a) studies of the professional development needs of tertiary English language teachers in Hong Kong and Cambridge, as well as the Test My Digital Skills questionnaires from The Digital Teacher (https://thedigitalteacher.com/). The questionnaire related to the RQs of this study in terms of the following two aspects: (1) participation in TPD throughout their careers and during OBL; (2) perspectives on TPD delivery in general and during OBL. In addition, respondents provided demographic information and described their digital practices. See Appendix 1 for the questionnaire.

To ensure the questions were clear, three English language teachers who did not participate in the study piloted the questionnaire and provided feedback on the instructions, individual items and complex wordings. This aligns with the instrument development practices suggested by Dörnyei (2007).

4.5 Data analysis – questionnaire (exploratory study)

To gain a general understanding of TPD for OBL, descriptive data analysis was employed for most questions. One exception was the data on how frequently the teachers participated in TPD activities before and during OBL. To understand these differences, a paired-samples t-test was conducted on each form of TPD in terms of impact and participation. There were no missing values. We visually inspected the histograms and found that the variables violated normality assumptions. We then performed the Related Samples Wilcoxon Sign Rank test. We also performed Bonferroni correction to avoid underestimating the type-1 error. The original alpha value was set at 0.05 and was corrected to $0.05/5 = 0.01$ for each round of analysis. See Mamede et al. (2012) and Yusoff et al. (2013) for examples of Bonferroni correction in educational research.

4.6 Data analysis – interviews (main study)

The interview data were subjected to iterative thematic analysis following Braun and Clarke's (2006) six-step approach. First of all, we transcribed the recordings. Then, we followed Braun and Clarke's six-step approach.

(1) During the familiarization stage, we read and re-read the interview transcripts and took notes of initial ideas.

(2) During the coding stage, we generated brief descriptions of the interesting features in relation to the three research questions. To answer the first research question, we looked for quotes that describe the participants' views on traditional TPD and microlearning. We coded these as "perceptions of traditional TPD" and "perceptions of microlearning". For the second question, we selected quotes that describe how microlearning as a form of TPD helped them develop skills to improve learners' proficiency. Sample codes include "improvement of skills through microlearning" and "impact on learners' proficiency". For the third question, we searched quotes that explicitly or implicitly suggest the usefulness of microlearning TPD in enhancing teachers' digital competence. These were coded as "impact on digital competence" or "usefulness of microlearning TPD". To improve dependability, we employed a code–recode strategy (Anney, 2014). Thus, after completing the first coding round, we waited for two weeks and re-coded the same data to ensure that our findings were stable over time. After the second coding round, no significant differences appeared in our themes and subthemes, indicating that the findings were dependable. At this stage, we selected representative quotes. Each quote that potentially answered the research question was assigned one or more codes. Aligned with Braun and Clarke's (2006) thematic analysis framework, only quotations containing "particular[ly] vivid examples" or "the essence of the point" was selected (p. 93).

(3) During the stage of searching for themes, we collated codes into potential themes.

(4) During the stage of reviewing themes, we checked the themes work in relation to the coded extracts and the entire data set.

(5) During the stage of defining and naming themes, we refined the particulars of each theme, and determined which data elements each theme captures.

(6) During the writing-up stage, we weaved together the analytic narrative and data extracts and contextualized the analysis in relation to existing literature.

To ensure validity, a second member check was performed (Merriam & Tisdell, 2016); each participant was provided with a copy of the themes and representative quotes. No participants requested additions or offered further suggestions.

5 Results (exploratory study)

5.1 Participation in TPD before and during OBL

To examine the differences between participants' perceptions of traditional TPD and TPD during OBL, we asked them about the frequency with which they participated in such activities in both periods. We asked about five different forms of TPD: conducting research, reading professional literature, attending conferences, sharing practices and participating in teachers' networks. To examine the actual differences, a Related Samples Wilcoxon signed rank test was conducted (see

Appendix 1). There were statistically significant differences in the frequency of conducting research (-73.96%, $z = -5.58$, $p < 0.01$) and attending conferences (-36.14%, $z = -4.04$, $p < 0.01$), both of which were more common before OBL. There were no significant differences in the frequency of the other types of TPD (see Appendix 2 Table 3 for a summary table). To further explore the general trend of decreasing participation, we encouraged the participants to elaborate on their TPD experiences and explore microlearning as a potential alternative in the main study.

5.2 Perspectives on delivery of TPD for OBL

To better understand how TPD can be delivered effectively, we asked participants about their experiences. While these results did not explicitly relate to microlearning, they provided insight into how this approach can fill gaps in TPD. Among the participants, 68.66% indicated that they had wanted to participate in more TPD than they did. Among this group, 64.18% reported a lack of suitable programmes and 22.39% indicated scheduling conflicts between TPD and work. Based on these results, we identified the need to explore what participants want from TPD specifically in the main study.

We also asked participants about their preferences regarding the timing and length of TPD. Some requested that TPD be offered when it was needed (44.78%) and others would prefer it to take place before the academic semester (32.84%). The majority (88.06%) expected a TPD session to be less than two hours. While it was encouraging to see agreement that flexibility is important, we also considered it necessary to determine what participants meant by "when needed" to deliver microlearning effectively. We decided to include questions in the main study to elicit further elaboration.

To summarise, the exploratory study provided some useful insights into the general trend of decreasing participation in TPD and its usefulness, but there was still significant potential for elaboration. Accordingly, we developed an interview guide with 11 questions to solicit more information and answer the three research questions. The formatted interview guide can be found in Appendix 3.

6 Results (main study)

6.1 Research question 1: Differences between traditional TPD and microlearning

The content of traditional TPD does not meet participants' expectations. Almost all of the participants stressed that they enjoy attending traditional TPD activities (e.g. workshops, lectures) online but these activities have left them unprepared for OBL, which requires them to use new tools and pedagogies. For example, Scott felt uncertain about how to teach content in the new environment, despite having attended TPD regularly. Similarly, Barbara stated that she is still struggling to understand "the relationship between how to use an app or website and our teaching materials".

This seems to suggest that the content of traditional TPD may not meet teachers' pedagogical needs in the OBL environment.

In addition to content, participants also perceive that the sharing sessions and community-of-practice activities that are part of traditional TPD come with practical limitations. Before the pandemic, it was common for them to seek out their colleagues informally to chat about how to use an app or conduct an activity. However, after the transition to OBL, participants reported that this practice was inhibited because they were not physically present at the university. They wanted practical experience but felt that it had become increasingly challenging. Ann noted that "long professional development sessions on using apps or how to teach online on Zoom are so artificial. She elaborated, "I can't chat with my friends. We can't play around with new ideas together. Instead, we have become passive learners." Barbara added, "Online teaching can be quite isolating and boring, and professional development needs to be fun and active. I mean, how can I otherwise stay motivated for one or two hours?" These comments highlight their dissatisfaction with the TPD implemented since the transition to OBL. It does not meet their practical or social needs and thus fails to contribute to increased competence or motivation.

In contrast to the limitations of traditional TPD, the participants perceived microlearning activities as flexible. They reported that the microlearning activities they tried gave them more autonomous and relevant training than traditional TPD. For example, John stated, "I can select what I want to learn based on my needs." He gave the example of learning "how to set up and use Quizlet to help my students understand key words". Generally, the participants reported that the microlearning activities allow them to take greater responsibility for their professional learning by selecting what and how much they want to learn. Michael shared that the sense of autonomy "provided a stress-free learning environment to brush up on my skills". These are positive findings, as many participants have struggled to find meaningful and relevant TPD since the beginning of the pandemic, as suggested by Ann:

> Often, I need something I can use in the next week that is simple to figure out and adapt my materials. Attending the sessions is often not very helpful as they tend to provide too much information, and then I can't remember how to use the tools later. With the given microlearning activities, I can briefly read a description of the tool, and watch a video or follow an infographic to learn how to use it with my students.

As each microlearning activity is 2–6 min long, teachers can use them to "experiment and explore new digital tools" (Scott) and "see briefly how [a tool] is connected with theory" (Olivia). Likewise, Mia stated, "We all have different skills and ideas, so we need more freedom in selecting our professional development." As these excerpts illustrate, participants found that microlearning is flexible and allows them to develop their skills and knowledge.

While most participants enjoy the flexibility of microlearning activities, two participants were concerned that, like traditional TPD, it is not very interactive. For example, John reported that microlearning does not allow "opportunities to interact with colleagues", while Charlotte "still missed the authentic interaction with colleagues during professional development activities".

6.2 Research question 2: Microlearning as a strategy to improve learners' proficiency

In the interviews, the participants said that although microlearning does not directly address how the tools can increase learners' proficiency, it does make them aware of new digital resources that can facilitate language acquisition. Patricia, for instance, explained that she is "not sure exactly how Lino will help them with improving their English, but in online learning, it is helpful for students to share their ideas". Others discussed that they often use apps or websites to add excitement to their classes without considering how they can facilitate language acquisition. They choose tools to incorporate into their teaching largely based on perceived ease of use and the enjoyment factor.

Some participants, however, did discuss how the tools introduced in microlearning activities can help students develop their language proficiency. For example, several mentioned Google Docs as a suitable tool which allows students to collaborate and use authentic language. However, they generally lacked knowledge about how to use technology beyond Google Docs and student response systems (e.g. Kahoot!) to facilitate language learning. Mia appreciated that microlearning activities "included a sentence about why it will help her learners" and Charlotte liked receiving "ideas for how to use it as a formative assessment". They found that microlearning taught them not only how to use technology but also why they should incorporate it in OBL. These comments suggest that microlearning learning activities can build language teachers' awareness and empower them to use new tools to enhance students' language proficiency.

6.3 Research question 3: Microlearning to enhance digital competence

Before the pandemic, all of the participants felt reasonably confident incorporating sporadic online learning into their face-to-face lessons. However, they experienced uncertainty and self-doubt in a fully online environment. Patricia stated, "I had to consider my learners' needs more carefully than before." Scott noted that he "struggled to adapt teaching materials and find suitable software. Not only Padlet, Kahoot! or Wordwall. I need more variety to provide a better learning experience." Participants need more guidance, relevant technical skills and digital pedagogy to deliver student-centred and engaging OBL lessons.

Even though the participants were previously confident in their digital competence, their confidence increased after they took part in microlearning activities. All of them reported that the microlearning activities informed them about using digital resources in an OBL environment. For example, Oliva learnt how to use the "literacy tool Wordwall to teach students reporting verbs interactively". Mia "started watching a short video about Wizer.me, then I accessed the Infographic for step-by-step instructions and created worksheets for my students." Likewise, Patricia said:

> I found Edpuzzle very easy to use. I can use an existing YouTube video and add multiple-choice questions so my students must watch it actively. It would take me several hours to figure out how to use Edpuzzle by myself.

Others mentioned how they decided a tool was unsuitable for their context. For instance, John explained:

> I heard a lot about Nearpod and was curious to find out how I could use it. After learning more about the software using the microlearning activities, I decided it was too troublesome and would distract me from the objectives by moving back and forth from the software to the class.

Microlearning allows teachers to adopt or reject new tools based on their suitability for their learning aims or time constraints. The participants agreed that this flexibility allowed them to choose the most useful digital tools. They felt actively involved in the learning process and appreciated the specific aims and short activities. Overall, microlearning allowed teachers to improve their technical knowledge and skills, enhance their digital competence and focus on and use technology effectively.

7 Discussion

7.1 RQ1: Differences between traditional TPD and microlearning

The findings of the study revealed notable differences between traditional TPD and microlearning in the context of OBL. Participants expressed dissatisfaction with traditional TPD, particularly regarding the relevance of the content and practical limitations. This aligns with previous research that has identified gaps in the ability of traditional TPD to address teachers' specific needs and the dynamic nature of OBL (Prestridge, 2019; Pynoo et al., 2011). For instance, our participants felt that traditional TPD activities (e.g. workshops and lectures) did not adequately prepare them for OBL and its associated tools and pedagogies.

However, the distinction between traditional TPD and microlearning, as identified by the interviewees, adds new dimensions to frameworks of effective TPD. Effective professional development in OBL should be ongoing and sustained (e.g. Geldenhuys & Oosthuizen, 2015; Powell & Bodur, 2019). In this study, after participating in the microlearning activities, interviewees redefined the concepts of active learning and duration (e.g. Consuegra & Engels, 2016; Desimone, 2009). Active learning in microlearning, for example, involves rapidly reading instructions, watching videos and experimenting with a tool within six minutes. Teachers can choose modules based on their needs and interest, working through them at their own pace. This approach allows for a more tailored learning experience than the TPD methods employed in previous studies (e.g. Borko et al., 2010). In addition, the short duration of microlearning activities allowed the participants to experiment with new digital tools and understand their relationship to pedagogical theories, which supports the

notion that microlearning can facilitate knowledge acquisition and application while limiting cognitive overload (Nikou, 2019; Jomah et al., 2016).

A critical feature of microlearning noted in this study is its ability to help teachers apply new skills and knowledge in practice by providing practical and actionable strategies that focus on both the technical and pedagogical aspects of the tools (e.g. Kohnke & Foung, 2023). However, it should be noted that participants expressed concerns about the lack of discussion and interaction in microlearning, key elements of successful TPD emphasised in earlier research (Dede, 2009; Philipsen et al., 2019; Lave & Wenger, 1991). This highlights the need to balance autonomy and flexibility with opportunities for collaboration and interaction in professional development (e.g. Vangrieken et al., 2015). As long as microlearning can address this concern, it will be able to demonstrate the features of effective TPD suggested in the literature.

7.2 Research question 2: Microlearning as a strategy to improve learners' proficiency

The findings of this study build upon previous research by demonstrating how microlearning activities can indirectly allow teachers to achieve TPD objectives, such as enhancing students' proficiency. According to the participants, microlearning activities heighten teachers' awareness of how various tools can improve student proficiency, rather than directly instructing them on their application for this purpose. This can be attributed to the brevity of microlearning, which allows participants to assimilate the content and contemplate the use of the technology to improve students' proficiency after the activity is finished. This is in line with earlier research on the features of microlearning, including the delivery of information in small "chunks" (Reinhardt & Elwood, 2019; Zhang & West, 2019) and enabling participants to digest and direct their learning (Emerson & Berge, 2018). With such features, one important function of microlearning is to influence teachers' beliefs and support them in adapting their pedagogical roles, as proposed by Taghizadeh and Hajhosseini (2021). The strengths of microlearning identified in this study address the need for higher education institutions to shift the focus of TPD from technological expertise to pedagogical implications, a recommendation put forth by Tondeur et al. (2015).

7.3 Research question 3: Microlearning to enhance digital competence

In line with recurring themes in the existing literature, this study provides evidence that microlearning can contribute to the development of teachers' digital literacy (Starkey, 2020; Zhang & West, 2019). The integration of authentic, contextualised learning experiences allows participants to apply their knowledge immediately. The format of microlearning also enables teachers to selectively cultivate their pedagogical and technological knowledge and provides opportunities for (language) teachers

to indirectly develop their disciplinary knowledge, as suggested by the Technological Pedagogical Content Knowledge model (Mishra & Koehler, 2006). This aligns with recent research advocating for the use of authentic learning tasks to promote the transfer of digital competence from training to practice (Moorhouse, 2023). Furthermore, participants in this study demonstrated that they developed learning strategies by selecting the most appropriate tools. This indicates that learning strategies (Krumsvik, 2009) and personalised TPD (Shamir-Inbal & Blau, 2022) remain vital for fostering teachers' digital competence through TPD. In summary, due to the concise and focused nature of microlearning activities, teachers can acquire new knowledge and skills to quickly enhance their digital literacy and promptly apply them in their teaching practice.

7.4 Limitations

There are several notable limitations to this study. First, it was conducted in the tertiary sector in Hong Kong. Therefore, the findings may not be generalisable to other contexts. Research on microlearning TPD should be extended to include teachers at various levels and contexts. Second, future studies should consider whether the changes in teachers' practices persist and how to ensure that their growth is sustained. In addition, it would be informative to use different research methods, such as lesson observations, to enrich the findings. Despite these limitations, our findings indicate that microlearning can be leveraged in an OBL context. Considering the increasing demands for OBL in higher education, there is an urgent need to help teachers gain pedagogical, theoretical and practical knowledge to enhance their teaching.

8 Conclusion and implications

This study aimed to explore the use of microlearning to deliver TPD for OBL in the context of English language teaching in Hong Kong higher education. The results indicated that the microlearning approach supported the development of teachers' technological competence and digital pedagogy. It also demonstrated that teachers perceived traditional TPD to be overly general, impractical and irrelevant. In contrast, they found microlearning to be flexible and stress-free. They also identified the indirect benefits of becoming aware of various technical tools that can improve students' language proficiency. The teachers perceived improvement in their digital competence (see Starkey, 2020), digital pedagogy (see Hubbard, 2018) and effective use of technology (see Kohnke, 2021a). Echoing previous research on TPD (see Stein et al., 2011; Hallas, 2006), microlearning seems to be important for teachers' professional growth and the practical aspects of OBL.

8.1 Implications

These positive results indicate that microlearning has significant potential to produce skilful and capable language teachers as education shifts to a "new normal". Based on the current study, we offer the following potential considerations for the design of microlearning activities:

1. **Expandable Bite-Sized Learning:** As teachers value flexibility, microlearning should continue to adopt a "bite-sized" design, which can then be expanded. For example, activities can easily be adapted by adding learning segments (e.g. infographics, videos or digital flashcards) that address new tasks or applications. To avoid cognitive overload, each segment must be focused, simple, short (1–6 min) and mobile-friendly, like those in the current study. This study only included a few microlearning activities, so there is the potential and technical capability to upload more to the platform. By expanding the range of activities, it will be possible to enhance the skills and capabilities of language teachers in more ways (Kohnke & Foung, 2023).
2. **Highly Accessible Platforms**: Due to the importance of accessibility, microlearning activities should be deployed on a platform that is widely used and conveniently reached anytime and anywhere (Hug, 2005). This could mean a course shell within the learning management systems used by the users' institutions (i.e. not a new platform). Microlearning activities can be less motivating when users need technical support to access them. No participants in the current study reported technical difficulties, so we emphasise hosting activities on an accessible platform.
3. **Enhancing Interactions in Microlearning Activities:** With the concern that microlearning activities are not interactive, an effort should be made to facilitate interaction. For example, teachers could be encouraged to ask for assistance from experienced peers online or engage in discussion by posting comments on the same microlearning platform (Palloff & Pratt, 2007). These platforms do not have to be hosted or maintained; they should simply allow users to ask for and provide help. Many learning management systems already use a similar approach to facilitate user interaction (e.g. Canvas Instructure Community: https://community.canvaslms.com/).

   This study has made an original contribution to the research on microlearning and TPD for OBL and provided suggestions on the design of microlearning activities. It has established that microlearning can expose teachers to new applications, increase digital pedagogy skills and encourage continuous learning. We close by noting that we did not intend to identify a single pedagogically correct way to implement microlearning. The ideal approach in the "new normal" will depend on the particular context and technology available.

Appendix 1 Sample questionnaire

Q1 What is your gender?

Q2 What is your age?

Q3 What is your total number of years of teaching experience?

Q4 How often have you engaged in the following professional development activities during your professional career?

Never

Less than once each year

Once each year

More than once each year

(Activities: Conducting action research into ICT skills; Attending conferences, workshops, seminars or courses in IT skills; Reading professional literature involving IT (e.g. journals, evidence-based papers, thesis papers); Sharing good teaching practice (e.g. mentoring, informal dialogues, lesson planning, peer observation etc) in use/adaption of IT with colleagues; and Participating in a network of teachers formed specifically for the professional development of teachers in IT skills (Community of Practice).)

Q5 How often have you engaged in the following professional development activities in the past 24 months?

Never

Less than once each year

Once each year

More than once each year

(Same activities from Q5)

Q6 How often do you use the following in your classes?

Padlet   Nearpod   Kahoot!   Wordwall

Apps   Flashcards   Videos   Cartoons

Q7 When should professional development be offered?

Summer or Christmas break

Just before the academic semester

During the academic semester

When needed

Q8 How long do you think professional development should last?

less than 1 hour

One to two hours

1 day

2-3 days

1 week

1+ weeks

Q9 In the last 12 months, did you want to participate in more professional development than you did?

Yes

No

Q10 If 'Yes' in the previous question, which of the following reasons best explain what prevented you from participating in more professional development than you did?

Professional development was too expensive/I could not afford it

There was a lack of employer support

Professional development conflicted with my work schedule

There was no suitable professional development offered

Appendix 2

Table 3 Related samples Wilcoxon sign rank test for differences in frequency for TPD

	Through career		Last 24 months		Percentage change	Standard error	Standardized test statistics
	Mean	SD	Mean	SD			
Conducting action research into ICT skills	0.96	0.77	0.25	0.53	−73.96	74.17	−5.58*
Attending conferences, workshops, seminars or courses in IT skills	1.66	0.95	1.06	0.57	−36.14	57.02	−4.04*
Reading professional literature involving IT	1.96	1.05	1.57	1.10	−19.90	53.52	−3.07
Sharing good teaching practice in use/adaption of IT with colleagues	2.10	0.46	1.78	0.76	−15.24	56.86	−3.39
Participating in a network of teachers formed specifically for the profes-sional development of teachers in IT skills	1.66	1.20	1.39	0.82	−16.27	88.32	−1.96

* $p < 0.01$

Appendix 3 Interview questions

1. What's been your experience with TPD in OBL during your career? What type of activities have you generally attended? Sought out? Why?
2. What are you looking for in a TPD in OBL?
3. Have they helped you to develop your OBL? Why?
4. How long do you think TPD in OBL should last? Why?
5. When should they ideally be offered? Why?
6. What do you think you need to know and learn to be successful in OBL? Why?
7. How effectively do you use digital tools in preparation, teaching, and assessments? What digital tools do you use? Why?
8. Do you think they help your students acquire the English language? Why?
9. Can you tell us story of how you use one of the tools?
10. Based on your experience of participating in microlearning in OBL? What are the main differences between a traditional TPD and microlearning TPD?
11. Has microlearning helped you to develop your OBL skills and knowledge? What has been the essential components? Why?

Declarations

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